8520A
Digital Multimeter

Calibration Manual

FLUKE®

8520A
Digital Multimeter

Calibration Manual

FLUKE®

P/N 541995
December 1979

©1981, John Fluke Mfg. Co., Inc., all rights reserved Litho in U.S.A.

8520A
Digital
Multimeter

Calibration Manual

Table of Contents

SECTION	TITLE	PAGE
1	**INTRODUCTION AND SPECIFICATIONS**	1-1
	1-1. THE 8520A INSTRUCTION MANUAL SET	1-1
	1-4. LIST OF RECOMMENDED TEST EQUIPMENT	1-3
	1-6. SPECIFICATIONS	1-3
2	**SHIPPING AND SERVICE INFORMATION**	2-1
	2-1. SHIPPING INFORMATION	2-1
	2-4. SERVICE INFORMATION	2-1
	2-7. QUESTIONS	2-1
3	**ACCESS PROCEDURES**	3-1
	3-1. INTRODUCTION	3-1
	3-3. MAINTENANCE AND ROUTINE CALIBRATION ACCESS	3-1
	3-5. NON-ROUTINE CALIBRATION ACCESS	3-1
4	**GENERAL MAINTENANCE**	4-1
	4-1. INTRODUCTION	4-1
	4-3. CLEANING INSTRUCTIONS	4-1
	4-5. LINE VOLTAGE SELECTION	4-1
	4-7. FUSE REPLACEMENT	4-1
5	**PERFORMANCE TEST**	5-1
	5-1. INTRODUCTION	5-1
	5-5. EQUIPMENT PREPARATION	5-1
	5-7. ZERO VERIFICATION	5-1
	5-9. DC VOLTS VERIFICATION	5-2
	5-11. RESISTANCE VERIFICATION	5-4
	5-13. AC VOLTAGE VERIFICATION	5-4

(continued on page ii)

TABLE OF CONTENTS, *continued*

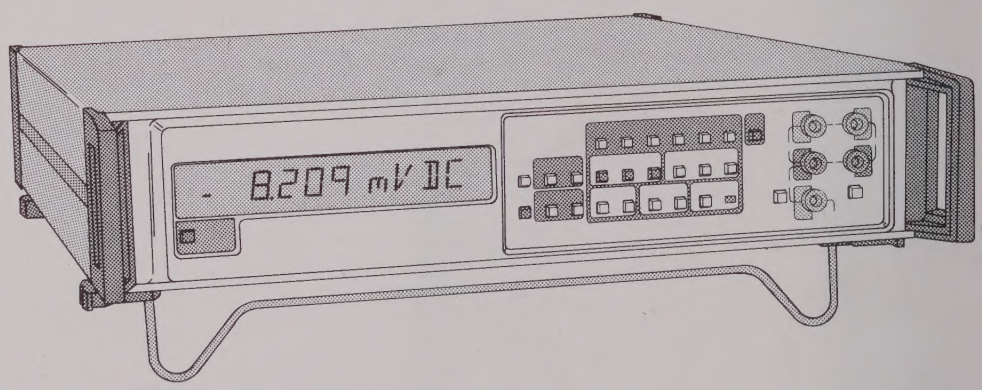
SECTION	TITLE	PAGE
6	**CALIBRATION ADJUSTMENTS**	6-1
6-1.	ROUTINE CALIBRATION ADJUSTMENTS	6-1
6-2.	Introduction	6-1
6-8.	Calibration (Cal) Digit	6-1
6-11.	Routine Calibration Preparation	6-2
6-13.	Reference Supply	6-2
6-15.	A/D Converter	6-2
6-17.	DC Buffer	6-4
6-19.	Ohms Converter	6-5
6-21.	AC Converter	6-5
6-23.	NON-ROUTINE CALIBRATION ADJUSTMENTS	6-7
6-24.	Introduction	6-7
6-26.	Preparing for Non-Routine Calibration	6-7
6-28.	Power Supply	6-7
6-30.	Auto Zero	6-8
6-32.	Reference Amplifier	6-8

List of Tables

TABLE	TITLE	PAGE
1-1.	Test Equipment	1-3
1-2.	8520A Specifications	1-3
2-1.	Fluke Technical Service Centers - U.S. and Canada	2-2
2-2.	Fluke Technical Service Centers - International	2-2
2-3.	Sales Representatives - U.S. and Canada	2-4
2-4.	Sales Representatives - International	2-5
5-1.	Zero Verification	5-2
5-2.	Low DC Volts Verification	5-3
5-3.	High DC Volts Verification	5-3
5-4.	Resistance Verification	5-4
5-5.	AC Voltage Verification	5-5
6-1.	A/D Converter Calibration	6-3
6-2.	A/D Converter Tests	6-4
6-3.	Ohms Converter Calibration	6-6
6-4.	AC Converter AC+DC Calibration	6-7
6-5.	AC Converter AC Calibration	6-7

List of Illustrations

FIGURE	TITLE	PAGE
	8520A Digital Multimeter	vi
1-1.	8520A Instruction Manual Set	1-2
1-2.	Outline Drawing	1-8
3-1.	Maintenance and Routine Calibration Access	3-2
3-2.	Non-Routine Calibration Access	3-3
4-1.	Line Voltage Selection Switches	4-2
5-1.	DC Voltage Verification	5-3
6-1.	A/D Converter Calibration	6-3
6-2.	Auto Zero Calibration Waveform	6-8



8520A Digital Multimeter

Section 1
Introduction and Specifications

WARNING

THESE SERVICING INSTRUCTIONS ARE FOR USE BY QUALIFIED PERSONNEL ONLY. TO AVOID ELECTRIC SHOCK, DO NOT PERFORM ANY SERVICING OTHER THAN THAT CONTAINED IN THE OPERATING INSTRUCTIONS UNLESS YOU ARE QUALIFIED TO DO SO.

1-1. THE 8520A INSTRUCTION MANUAL SET

1-2. The John Fluke Model 8520A Digital Multimeter is documented by a set of three manuals: the 8520A Operator's Manual, the 8520A Calibration Manual, and the 8520A Service Manual. The 8520A Operator's Manual introduces the operator to the 8520A, familarizes the operator with all instrument controls, connectors, and indicators, and presents detailed local and remote operating information and procedures. The 8520A Calibration Manual provides general maintenance procedures, Performance Tests, and Calibration Adjustment procedures. The 8520A Service Manual contains the theory of operation, troubleshooting information, a list of replaceable parts, and schematics. As Figure 1-1 shows, the three manuals can either be separated for use in different areas or joined together in a single binder.

1-3. The information in this, the 8520A Calibration Manual, is divided into six sections:

1 INTRODUCTION AND SPECIFICATIONS	Introduces the 8520A Instruction Manual Set, lists the recommended test equipment necessary to complete the Performance Tests and Calibration Adjustments, and lists the instrument specifications.
2 SHIPPING AND SERVICE INFORMATION	If there is a problem with your 8520A, how to get it corrected, and how to ship the instrument.
3 ACCESS PROCEDURES	Describes how to gain access to the Calibration Adjustments and general maintenance circuit areas.

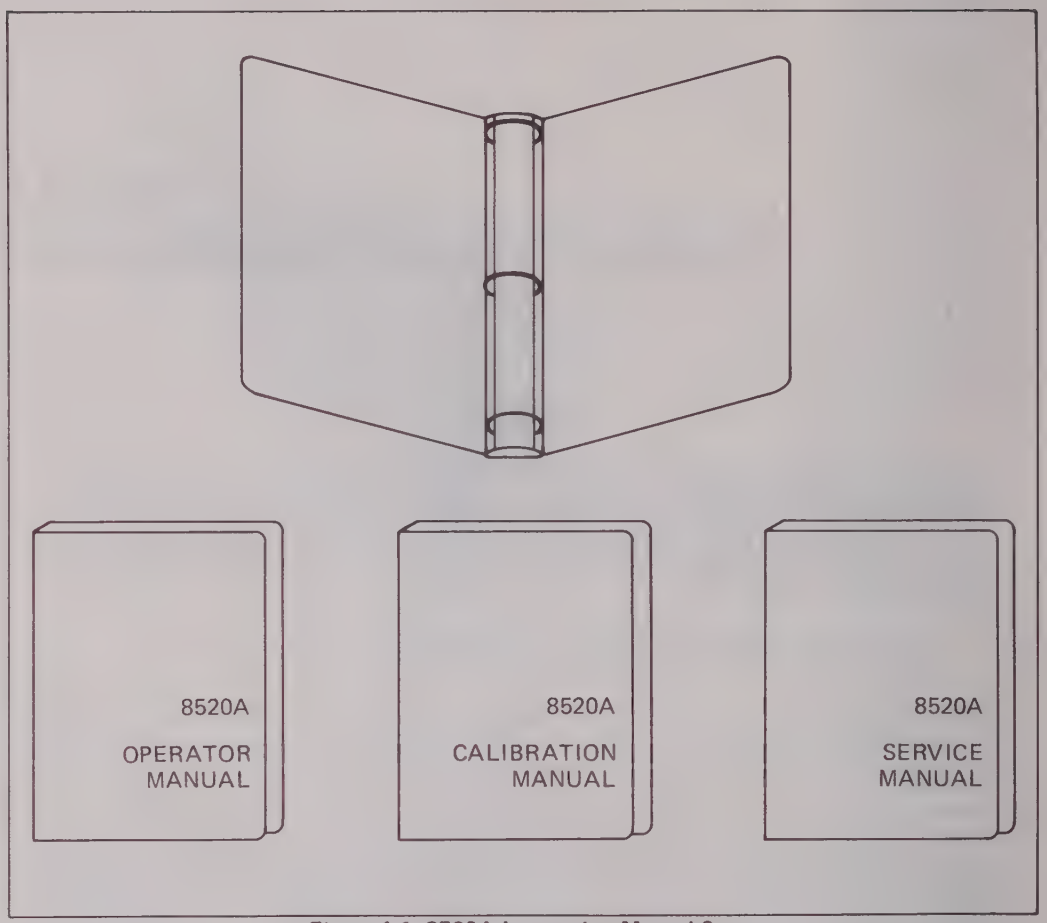


Figure 1-1. 8520A Instruction Manual Set

4 GENERAL MAINTENANCE	Describes how to replace fuses, select a different line voltage, clean the instrument, etc.
5 PERFORMANCE TESTS	A set of procedures that verify that the 8520A is performing within the specifications listed in Section 1. All of these procedures are completed with the INSTRUMENT COVERS IN PLACE.
6 CALIBRATION ADJUSTMENTS	A set of procedures that tell how to perform the 8520A Calibration Adjustments so that the instrument operates within the specifications listed in Section 1.

1-4. LIST OF RECOMMENDED TEST EQUIPMENT

1-5. Table 1-1, lists the test equipment required to complete the Performance Tests and Calibration Procedures described in this manual. Equivalent instruments can be substituted if the recommended models are is not available.

1-6. SPECIFICATIONS

1-7. Table 1-2 lists the 8520A specifications.

Table 1-1. Test Equipment

ITEM	SPECIFICATIONS (MINIMUM)	NOMENCLATURE
DMM	5½ digits 0.005% dc accuracy	FLUKE 8800A
Oscilloscope	General Purpose	TEKTRONIX T900 Series
DC Voltage Standard	0.001% Accuracy	FLUKE 332D or 335D
Ratio Standard	0.1 ppm Resolution, 1 ppm Terminal Linearity	FLUKE 720A
AC Calibrator	≥0.03% Accuracy @ 20 kHz	FLUKE 5200A
Power Amplifier	≥0.044% Accuracy @ 20 kHz	FLUKE 5205A or 5215A
Standard Resistor w/Accessories		ESI 1010 100Ω and 10 kΩ, ESI 1050 1MΩ. ESI SB103 shorting bars, ESI PC101 Parallel Compensation Network
Load	1 MΩ/1 μF	1 MΩ ±1% 1/8 W, mF resistor in parallel with a 1 μF ±20% 10V capacitor

Table 1-2. 8520A Specifications

DC VOLTS

INPUT CHARACTERISTICS:

RANGE	FULL-SCALE	RESOLUTION	INPUT RESISTANCE
100 mV	199.999	1 μV	≥10,000 MΩ
1V	1.99999	10 μV	≥10,000 MΩ
10V	16.0100	100 μV	≥10,000 MΩ
100V	130.100	1 mV	10 MΩ
1000V	1024.00	10 mV	10 MΩ

ACCURACY ±(% of input + number of digits)

RANGE	24 HOURS 23°C ±1°C	90 DAYS 18°C to 28°C	1 YEAR 18°C to 28°C	PLUS TEMP. COEFFICIENT PER °C*
100 mV	0.003 + 5	0.0065 + 6	0.011 + 10	0.0005 + 0.5
1V	0.003 + 1	0.006 + 2	0.011 + 2	0.0005 + 0.15
10V	0.002 + 1	0.005 + 1	0.009 + 1	0.0004 + 0.10
100V	0.003 + 1	0.007 + 2	0.012 + 2	0.0005 + 0.15
1000V	0.0035 + 1	0.0065 + 1	0.011 + 1	0.0005 + 0.10

**From 22°C to 0°C or 24°C to 50°C, 24 hours specification*
From 18°C to 0°C or 28°C to 50°C, 90 day or 1 year specification

Table 1-2. 8520A Specifications (cont)

HIGH SPEED ACCURACY: ±(% of input + least significant bit)*

RANGE	90 DAYS 18°C to 28°C	1 YEAR 18°C to 28°C	PLUS TEMP. COEFFICIENT PER °C
100 mV	0.01 + 1	0.015 + 1	0.001 + .1
1V	0.01 + 1	0.015 + 1	0.001 + .05
10V	0.01 + 1	0.015 + 1	0.001 + .05
100V	0.01 + 1	0.015 + 1	0.001 + .05
1000V	0.01 + 1	0.015 + 1	0.001 + .05

**Typical with 60 Hz line, remote operation, 500 readings per second, 2-byte binary output with 14 bits of data.*

TYPICAL NORMAL MODE REJECTION:

LINE FREQ.	FILTER SETTLING TIME					
	25 ms	50 ms	100 ms	200 ms	500 ms	1s
50 Hz	65 dB	68 dB	71 dB	80 dB	*83 dB	86 dB
60 Hz	65 dB	68 dB	71 dB	85 dB	*88 dB	91 dB
400Hz	53 dB	56 dB	60 dB	120 dB	*123 dB	126 dB

**Guaranteed minimum rejection*

COMMON MODE REJECTION: True 100 dB at 50 Hz and 60 Hz with 1 kΩ unbalance in either lead. Effective CMR is equal to normal mode rejection plus true CMR.

MAXIMUM INPUT: ±1000V Peak, HI to LO or GUARD to chassis terminals, and ± 200V Peak, GUARD to LO terminals, for any range.

MAXIMUM READING RATE:

OPERATION	RESOLUTION	LINE	READING RATE
Local/Remote	5-1/2 digits	50 Hz 60 Hz	200 rdgs/sec 240 rdgs/sec
Remote	4-1/2 digits	50 Hz 60 Hz	>500 rdgs/sec >500 rdgs/sec

Input Current ≤50pA for 30 days @ 18°to 20°C

AC VOLTS (TRUE RMS)

INPUT CHARACTERISTICS

RANGE	FULL–SCALE	RESOLUTION	INPUT IMPEDANCE
1V 10V 100V 650V	1.99999 16.0100 130.100 650.00	10 μV 100 μV 1 mV 10 mV	1MΩ,≤100pF at the V/Ω INPUT terminal

Table 1-2. 8520A Specifications (cont)

ACCURACY: ±(% of input + % of full-scale)
For 650V range multiply % FS error shown by 1.6

FREQUENCY	24 HOURS 23°C±1°C			90 DAYS 23°C to 28°C			1 YEAR 18°C to 28°C		
	% of INPUT	+ % FS AC	+ % FS AC+DC	% of INPUT	+ % FS AC	+ % FS AC+DC	% of INPUT	+ % FS AC	+ % FS AC+DC
10 Hz to 20 Hz*	3.0	0.5	0.6	3.0	0.6	0.7	3.5	0.6	0.7
20 Hz to 40 Hz*	0.4	0.3	0.4	0.5	0.5	0.6	0.6	0.6	0.7
40 Hz to 20 kHz	0.08	0.02	0.06	0.1	0.03	0.08	0.15	0.05	0.16
20 kHz to 100 kHz	1.0	0.3	0.4	1.0	0.3	0.4	2.0	0.6	0.8
100 kHz to 300 kHz	2.4	0.6	0.6	2.4	0.6	0.6	4.0	1.0	1.0
300 kHz to 1 MHz	8.0	2.5	2.5	8.0	2.5	2.5	15.0	5.0	5.0

*Assumes smoothing using the Statistics Math Program (#8).

TEMPERATURE COEFFICIENT: 18°C to 0°C or 28°C to 50°C, to 20 kHz.
AC MODE: ±(.007% of input + .007% FS)/°C
AC + DC MODE: ±(.007% of input +.014% FS)/°C

MAXIMUM INPUT: ±1000V, Peak HI to LO or GUARD to chassis terminals, and ±200V Peak GUARD to LO terminals for any range.

CREST FACTOR: Exceeds 4:1 @ full scale, increasing downscale.

MAXIMUM READING RATE: 10 rdgs/sec.

OHMS

INPUT CHARACTERISTICS:

RANGE	FULL-SCALE	RESOLUTION	CURRENT THRU UNKNOWN	OPEN CIRCUIT VOLTAGE
10Ω	19.9999	100 μΩ	10 mA	
100Ω	199.999	1 mΩ	10 mA	
1000Ω	1999.99	10 mΩ	1.0 mA	
10 kΩ	19.9999	100 mΩ	0.1 mA	<8V
100 kΩ	199.999	1Ω	14.5 μA (max)	
1 MΩ	1.99999	10Ω	1.5 μA (max)	
10 MΩ	19.999	1 kΩ	1.5 μA (max)	

ACCURACY: ±(% of input + number of digits)

RANGE	24 HOURS 23°C ±1°C	90 DAYS 18°C to 28°C	1 YEAR 18°C to 28°C	PLUS TEMP. COEFFICIENT PER °C*
10Ω	0.0045 + 6	0.0080 + 7	0.0140 + 12	0.0007 + 0.2
100Ω	0.0035 + 2	0.0070 + 2	0.0125 + 3	0.0007 + 0.2
1000Ω	0.0035 + 2	0.0070 + 2	0.0125 + 3	0.0007 + 0.2
10kΩ	0.0035 + 2	0.0070 + 2	0.0125 + 3	0.0007 + 0.2
100kΩ	0.0040 + 2	0.0090 + 2	0.0140 + 3	0.0012 + 0.2
1MΩ	0.0090 + 2	0.0160 + 2	0.0200 + 3	0.0020 + 0.2
10MΩ	0.0300 + 1	0.0440 + 1	0.0450 + 3	0.0030 + 0.2

**From 18°C to 0°C or 28°C to 50°C*

Table 1-2. 8520A Specifications (cont)

MAXIMUM INPUT: ±400V peak for any range.

MAXIMUM READING RATE: 10/SEC at 100KΩ and above.

OPERATION	RESOLUTION	LINE	READING RATE
Local/Remote	5-1/2 digits	50 Hz 60 Hz	200 rdgs/sec 240 rdgs/sec
Remote	4-1/2 digits	50 Hz 60 Hz	>500 rdgs/sec >500 rdgs/sec

CONDUCTANCE

RANGE: 100 nS

FULL-SCALE: 202.00 nS

RESOLUTION: 0.01 nS

ACCURACY: ±(% of input + number of digits)

24 HOURS 23°C±1°C	90 DAYS 18°C to 28°C	1 YEAR 18°C to 28°C	*PLUS TEMP. COEFFICIENT PER °C
0.04 + 5	0.05 + 5	0.06 + 5	0.004 + 1

**From 18°C to 0°C or 28°C to 50°C*

MAXIMUM INPUT: ±400V peak

MAXIMUM READING RATE: 10 rdgs/sec

EXTERNAL REFERENCE

OPERATING RANGE: ±0.5V dc to ±33V dc as long as external reference is within ±16.5V of input LO terminal.

INPUT IMPEDANCE: 10,000 MΩ between external reference HI or LO terminals and input LO terminals.

ACCURACY:

X-REF VOLTAGE	ACCURACY
16.5V to 33V 0.5V to 16.5V	±(A + B + 20 ppm) ±[A + B + (400 ppm ÷ |Vref|)]

NOTE: A = DC 10 volt range accuracy
B = Input voltage or resistance range accuracy

MAXIMUM INPUT: ±180V peak between external reference HI or LO and input LO; ±360V peak between external reference HI and LO.

Table 1-2. 8520A Specifications (cont)

TRANSFER ACCURACY:

The following accuracy specifications apply when:
——Filter settling time is 500 or 1000 ms.
——Measurements are made more than 2 hours after warm-up.
——Measurements are made within one range.
——Standard is checked at least every hour.
——Ambient temperature stability within ±1°C.

DC VOLTAGE:

RANGE	±(% of input + number of digits)
100 mV	0.0020 + 4
1V	0.0020 + 1
10V	0.0010 + 1
100V	0.0020 + 1
1000V	0.0020 + 1

AC VOLTAGE (all ranges):

FREQUENCY	±(% of input + % of full-scale)
10 Hz to 20 Hz	1.0 + 0.2
20 Hz to 40 Hz	0.1 + 0.1
40 Hz to 20 kHz	0.005 +0.007
20 kHz to 100 kHz	0.100 + 0.030
100 kHz to 1 MHz	0.500 + 0.060

AC VOLTAGE, DC COUPLED: Same as AC Voltage except 40Hz - 20KHz, 0.005+0.010

RESISTANCE:

RANGE	±(% of input + number of digits)
10Ω	0.0030 + 5
100Ω	0.0020 + 2
1000Ω	0.0020 + 2
10 kΩ	0.0020 + 2
100 kΩ	0.0020 + 2
1 MΩ	0.0050 + 2
10 MΩ	0.0100 + 1

CONDUCTANCE: ±(0.02% of input + 0.02 nS)

GENERAL:

INTERFACE: IEEE-488-1978 is standard.

TEMPERATURE: 0°C to 50°C operating; −25°C to +75°C non-operating.

RELATIVE HUMIDITY: ≤95% at 25°C, ≤75% at 40°C, ≤45% at 50°C.

SHOCK AND VIBRATION: Meets MIL-T-28800B for type III, Class 5, Style E.

Table 1-2. 8520A Specifications (cont)

POWER: 100, 120, 220, or 240V ac, ±10%; 50, 60, or 400 Hz ±5%, ⩽50W.

SIZE: 8.89 cm H/47.00 cm L/43.18 cm W––(3 1/2 in H/18 1/2 in L/17 in W) See Figure 1-2.

WEIGHT: 9.56 kg (21 lbs)

PROTECTION CLASS CODE 1: (Relates solely to insulation or grounding properties in IEC 348).

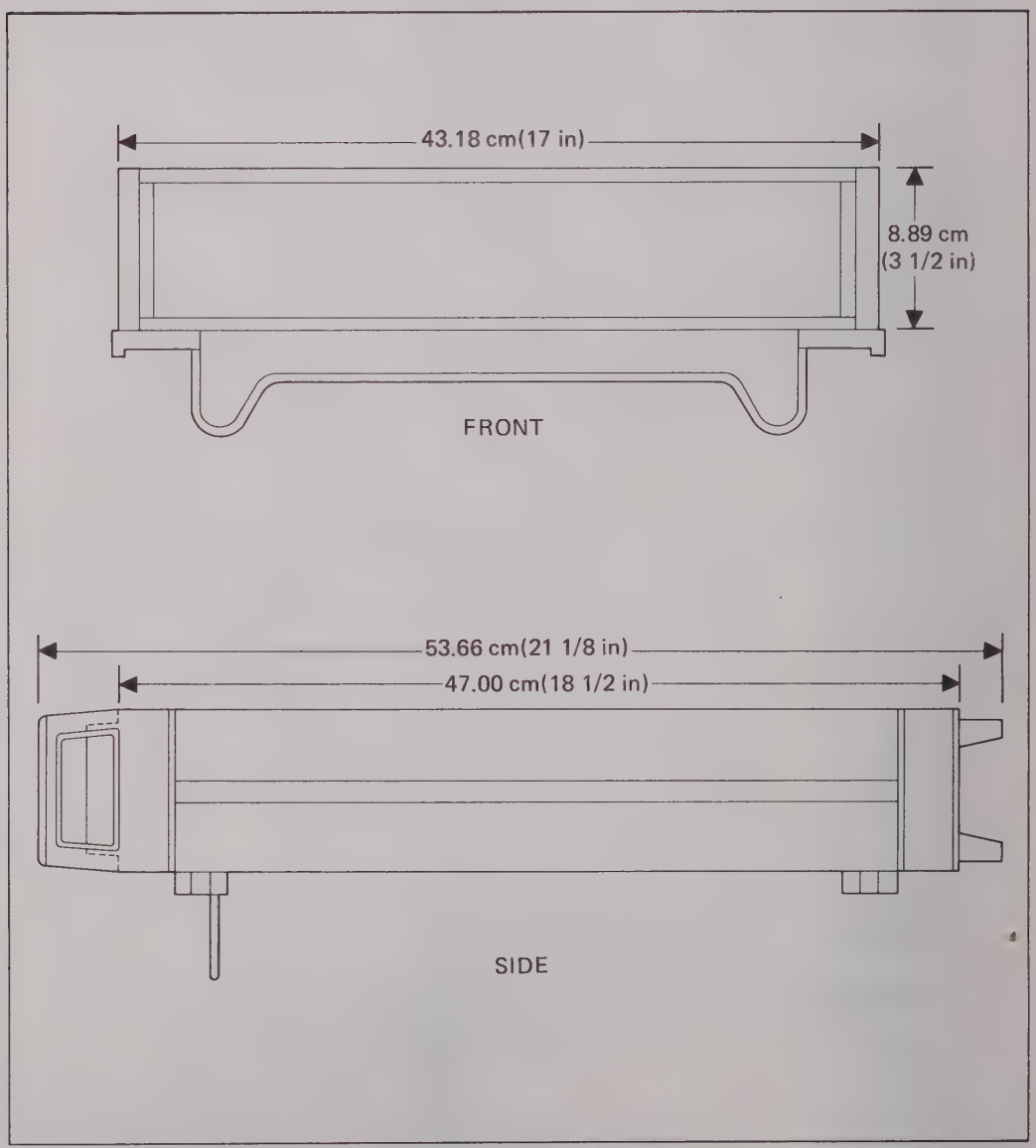


Figure 1-2. Outline Drawing

Section 2
Shipping and Service Information

2-1. SHIPPING INFORMATION

2-2. The 8520A is packaged and shipped in a foam-packed container. When you receive the 8520A, inspect the instrument thoroughly for possible shipping damage. Special instructions for inspection and claims are included on the shipping container.

2-3. If reshipment is necessary, use the original container. If the original container is not available, order a new container from John Fluke Mfg. Co., Inc./P.O. Box C9090/Everett, Washington 98206, telephone (206) 342-6300.

2-4. SERVICE INFORMATION

2-5. Each John Fluke Model 8520A Digital Multimeter is warranted for a period of one year upon delivery to the original purchaser. The WARRANTY is located at the front of this manual.

2-6. Factory authorized calibration and service for each Fluke product is available at various worldwide locations. The following pages provide a complete list of these service centers. If requested, the customer will be provided with an estimate before any work begins on instruments that are beyond the Warranty period.

2-7. QUESTIONS

2-8. For additional information, contact your nearest John Fluke Sales Representative (see following pages), or the John Fluke Mfg. Co., Inc. at the address or telephone number given above.

(Blank Page)

TECHNICAL SERVICE CENTERS

U.S.A.

CA, Burbank
John Fluke Mfg. Co., Inc.
(213) 849-4641

CA, Santa Clara
John Fluke Mfg. Co., Inc.
(408) 727-8121

CO, Denver
John Fluke Mfg. Co., Inc.
(303) 750-1228

FL, Orlando
John Fluke Mfg. Co., Inc.
(305) 896-2296

IL, Rolling Meadows
John Fluke Mfg. Co., Inc.
(312) 398-5800

MA, Burlington
John Fluke Mfg. Co., Inc.
(617) 273-4678

MD, Rockville
John Fluke Mfg. Co., Inc.
(301) 770-1576

NJ, Paramus
John Fluke Mfg. Co., Inc.
(201) 262-9550

TX, Dallas
John Fluke Mfg. Co., inc.
(214) 233-9945

WA, Everett
John Fluke Mfg. Co., Inc.
(206) 356-5560

Other Countries

Argentina, Buenos Aires
Coasin S.A.
Tel: 552-5248/3485
TLX: 122284 COASN AR

Australia, Concord
Elmeasco Instruments Pty Ltd.
Tel: (02) 736-2888
TLX: (790) 25887

Australia, Mount Waverley
Elmeasco Instruments Pty Ltd.
Tel: 03-233-4044
TLX: 36206

Australia, Brisbane
Elmeasco Instruments Pty Ltd.
Tel: (07) 229-3161

Austria, Vienna
Walter Rekirsch Electronische Gerate GmbH & Co.
Tel: (0222) 235555
TLX: 134759

Belgium, Brussels
Fluke (Belgium) SA/NA
Tel: (02) 2164090
TLX: 26312

Brazil, Sao Paulo
Fluke Brasil-Industria E Comercio Ltda.
Tel: (011) 421-3603
TLX: 01135589 FLKE BR

Canada, Calgary, AB
Allan Crawford Associates Ltd.
Tel: (403) 230-1341

Canada, Burnaby, BC
Allan Crawford Associates Ltd.
Tel: (604) 294-1326

Canada, Mississauga, ON
Allan Crawford Associates Ltd.
Tel: (416) 678-1500

Canada, St. Laurent, PQ
Allan Crawford Associates Ltd.
Tel: (514) 731-8564

Chile, Santiago
Intronica Chile Ltda
Tel: 44940
TLX: 240301

China, Beijing
Beijing Radio Research Institute
Tel: 445612

Colombia, Bogota
Sistemas E Instrumentacion, Ltda.
Tel: 232-45-32
TLX: 45787 COASN CO

Denmark, Ballerup
Tage Olsen A/S
Tel: (02) 658111
TLX: 35293 TOAS SK

Ecuador, Quito
Edificio "Jerico"
Tel: 529684, 526759
TLX: 2865 Protec Ed

Egypt, Cairo
Electronic Engineering Liaison Office
Tel: 691588
TLX: (927) 92502

England, Watford, Herts
Fluke (Great Britain) LTD
Tel: 44-923-40511
TLX: 934583

Finland, Kauniainen
Oy Findip AB
Tel: (0) 5052255
TLX: 123129

France, BUC
M.B. Electronique S.A.
Tel: (01) 9568131
TLX: 695414

Greece, Athens
Hellenic Scientific Representations
Tel: (01) 711140
TLX: 219330

Hong Kong, Hong Kong
Schmidt & Co. (H.K.) Ltd
Tel: 5-455644
TLX: 74766 SCHMC HX

India, Bombay
Hinditron Services Pvt. Ltd.
Tel: 811316, 815344
TLX: 953-112326 HSPL IN

India, Bangalore
Hinditron Services Pvt. Ltd.
Tel: 33139
TLX: 0845741

India, New Delhi
Hinditron Services Pvt. Ltd.
Tel: 619118
TLX: 031 4890 SRMP IN

Indonesia, Jakarta Selatan
P.T. Dwi Tunggal Jaya Sakti
Tel: 716374
TLX: 47308 DIJS IA

Israel, Ramat Hasharon
R.D.T. Electronics Engineering Ltd
Tel: (03) 483216
TLX: 32143

Italy, Milan
Sistrel S.p.A.
Tel: (02) 6181893
TLX: 334643

Italy, Rome
Sistrel S.p.A.
Tel: (06) 5915551
TLX: 68356

Japan, Tokyo
John Fluke Mfg. Co., Inc.
Japan Branch
Tel: (03) 434-0181
TLX: (781) 2424331 (FLUKJPJ)

Korea, Seoul
Electro-Science Korea Co.
Tel: 261-7702, 260-1908
TLX: K25381

Malaysia, Petaling Jaya
Mecomb Malaysia SDN BHD
Tel: 573455
TLX: MA37605

Mexico, Mexico D.F.
Electronica y Tecnologia Avanzada S.A. de C.V. (ETA)
Tel: 393 09 02 or 393 57 62
TLX: 0172697 BLOSME

Netherlands, Maarssen
Fluke (Nederland) B.V.
Tel: (030) 436514
TLX: 47128

Netherlands, Tilburg
Fluke (Holland) B.V.
Tel: (013) 673973
TLX: 52237

New Zealand, Auckland
McLean Information Technology, Ltd.
Tel: 501-801, 501-219, 587-037
TLX: NZ21570 THERMAL

Norway, Oslo
Morgenstierne & Co A/S
Tel: (02) 356110
TLX: 71719

Pakistan, Karachi
Pak International Operations
Tel: 221127, 239052
TLX: 24494 PIO PK

Peru, Lima
Importaciones Y Representaciones Electronicas S.A.
Tel: 288650
TLX: 37425663

Philippines, Metro Manila
Spark Radio & Electronics Corp.
Tel: 78-78-16
TLX: 27901 RLA PH

Portugal, Lisboa
Decada-Equipamentos de Electronica, Lda.
Tel: (19) 574984
TLX: 18469

Republic of Singapore, Singapore
Rank O'Connor's (PTE) Limited
Tel: 637944, 239052
TLX: OCONSIN RS21023

Republic of South Africa, Bramley
Fluke S.A. (Pty) Ltd.
Tel: (011) 786-3170
TLX: 424328

Spain, Alcorcon (Madrid)
Hispano Electronics S.A.
Tel: (01) 6194108
TLX: 22404/42634

Sweden, Vallingby
Teleinstrument AB
Tel: (08) 380370
TLX: 15770

Switzerland, Zurich
Traco Electronic AG
Tel: (01) 2010711
TLX: 54318

Taiwan, Taipei
Schmidt Scientific Far East Ltd.
Tel: 5414600
TLX: 11111 Schmidt

Thailand, Bangkok
Measuretronix Ltd.
Tel: 3143369, 3143430
TLX: 81143 DEJOBKK TH

Turkey, Istanbul
Erkman Elektronik Aletler
Tel: (01) 5461
TLX: 23353

Uruguay, Montevideo
Coasin Uruguaya S.R.L.
Tel: 29-31-952
TLX: UY 6571 OROCUER

Venezuela, Caracas
Coasin, C.A.
Tel: 38-78-42, 38-78-86
TLX: 21027 EMVEN VE

West Germany, Ismaning
Fluke (Deutschland) GmbH
Tel: (089) 96050
TLX: 0522472

FLUKE®
John Fluke Mfg. Co., Inc., P.O. Box C9090, Everett, WA 98206
Fluke (Holland) B.V., P.O. Box 5053, 5004 EB, Tilburg, The Netherlands. Phone (013) 673973
Litho in U.S.A. 1/83

INTERNATIONAL SALES OFFICES

Argentina ●
Coasin, S.A.
Virrey del Pino 4071
Buenos Aires, Argentina
Tel: 552-5248, TLX. 22284

Australia ●
Elmeasco Instruments Pty Ltd
P.O. Box 30, Concord, N.S.W
Australia 2137
Tel: (2) 736-2888, TLX: (790) 25887

Elmeasco Instruments Pty Ltd
21-23 Anthony Drive
Mt. Waverly, VIC 3149
Australia
Tel: 233-4044, TLX: (790) 36206

Elmeasco Instruments Pty Ltd
Professional Suites Bldg.
G.P.O. Box 2360
Brisbane, 4001, Australia
Tel: (07) 229-3161

Elmeasco Instruments Pty Ltd
G.P.O Box 1240, Adelaide
South Australia 5001
Tel: (08) 271-1839

Elmeasco Instruments Pty. Ltd
P.O. Box 95, Gosnells
West Australia 6110
Tel: (09) 398-3362

Austria ■
Walter Rekirsch
Elektronische Gerate GmbH & Co
Vertrieb KG
Obachgasse 28
Vienna, Austria
Tel. (0222) 235555, TLX: 134759

Bangladesh ●
Motherland Corporation
24 Hatkhola Rd., Tikatuli
Dacca 3, Bangladesh
Tel. 257249 or 255776

Belgium ■
Fluke (Belgium) S.A./N.V
6, Rue de Geneve
1140 Brussels, Belgium
Tel. (2) 2164090, TLX. 26312

Bolivia ●
Coasin Bolivia S.R.L
Casilla 7295, La Paz, Bolivia
Tel. 40962, TLX: 3233

Brazil ●
Fluke Brasil-Industria E
Commercio LTDA
Al. Amazonas 422,
Alphaville, Barueri,
CEP 06400 Sao Paulo, Brazil
Tel: (011) 421-5477, TLX: 01135589

Fluke Brasil-Industria E
Commercio LTDA
Av Henrique Valadares, 23/401
Rio de Janeiro, Brazil
Tel. 252-1297

Brunei ●
Rank O'Connor's (PTE) Limited
No. 8, BK D
Surfri Shop House Complex
Mile 1, Jalong Tutong
Bandar Seri Begawan, Brunei
Tel 26680

Bulgaria ■
Amtest Associates Ltd
Clarence House, 31, Clarence St
Staines, Middlesex TW18 4SY
United Kingdom
Tel: (784) 63555, TLX. 928855

Canada ●
Allan Crawford Assoc., Ltd
#14 1935 30th Ave. N.E.
Calgary, Alberta T2E 6Z5
Tel: (403) 230-1341, TLX: 03-821186

Allan Crawford Assoc., Ltd.
P.O Bag 3967
Postal Station "D"
Edmonton, Alberta T5L 4K1
Tel: (403) 451-4893

Allan Crawford Assoc., Ltd.
3795 William Street
Burnaby, British Columbia V5C 3H3
Tel: (604) 294-1326, TLX. 04-54247

Allan Crawford Assoc., Ltd.
881 Lady Ellen Place
Ottawa, Ontario K1Z 5L3
Tel: (613) 722-7682, TLX. 0533600

Allan Crawford Assoc., Ltd
6503 Northam Drive
Mississauga, Ontario L4V 1J2
Tel: (416) 678-1500, TLX: 06968769

Allan Crawford Assoc., Ltd
7918 cote de Liesse
St. Laurent, Quebec H4T 1E7
Tel. (514) 731-8564, TLX. 05824944

Chad ■
Fluke (Holland) B.V.
P.O. Box 5053, 5004 EB Tilburg
Zevenheuvelenweg 53, 5048 AN Tilburg
The Netherlands
Tel: (013) 673973, TLX: 52237

Chile ●
Intronica Chile Ltda
Manuel Montt 024 - Of. D
Casilla 16228, Santiago 9, Chile
Tel. 44940, TLX. 240301
Attn: Intronica Chile

China, People's Republic of ●
Fluke International Corporation
P.O. Box C9090
Everett, WA 98206, U.S.A.
Tel. (206) 356-5511
TLX. 152662 JOHN FLUKE EVT

Colombia ●
Sistemas E Instrumentacion, Ltda
Carrera 13, No. 37-43, Of. 401
Ap. Aereo 29583
Bogota DE, Colombia SA
Tel: 232-45-32, TLX. 45787

Cyprus ■
Chris Radiovision Ltd
P.O. Box 1989, Nicosia, Cyprus
Tel: 66121, TLX. 8262395

Czechoslovakia ■
Amtest Associates Ltd
Clarence House, 31, Clarence St
Staines, Middlesex TW18 4SY
United Kingdom
Tel: (784) 63555, TLX. 928855

Denmark ■
Tage Olsen A/S
Ballerup Byvej 222
DK - 2750 Ballerup, Denmark
Tel: (2) 658111, TLX. (855) 35293

Ecuador ●
Proteco Coasin Cia., Ltda
Edificio "Jerico"
Ave. 12 de Octubre #2285 y
Ave. Orellana (Planta Baja)
Quito, Ecuador
Tel: 529684, TLX. (393) 2865

Proteco Coasin Cia., Ltda
Calderon 103 y Malecon
Casilla #9733
Guayaquil, Ecuador
Tel. 526093

Egypt and Sudan ■
Electronic Engineering Liaison Office
P.O. Box 2891 Horreya
Heliopolis, Cairo, Egypt
Tel. 691588, TLX. (927) 92502

England ■
Fluke (Great Britain) LTD
Colonial Way
Watford, Herts, WD2 4TT
United Kingdom
Tel: (0923) 40511, TLX: (851) 934583
Rapifax: (0923) 25067

Ethiopia ■
Fluke (Holland) B.V.
P.O. Box 5053, 5004 EB Tilburg
Zevenheuvelenweg 53, 5048 AN Tilburg
The Netherlands
Tel: (013) 673973, TLX: 52237

Fiji ●
AWA Fiji
47 Forster Road, Walu Bay
Suva, Fiji
Tel: 312079, TLX: FJ2347

Finland ■
Oy Findip AB, Teollisuustie 7
02700 Kauniainen, Finland
Puh. (0) 5052255, TLX. (857) 123129

France ■
M.B. Electronique S.A.
Rue Fourny 606, Z1 Centre
78530 BUC
B.P. No. 31
78530 BUC, France
Tel: (3) 9568131, TLX: (842) 695414

German Democratic Republic ■
Amtest Associates Ltd
Clarence House, 31, Clarence St
Staines, Middlesex TW18 4SY
United Kingdom
Tel. (784) 63555, TLX: 928855

German Federal Republic ■
Fluke (Deutschland) GmbH
Max-Hueber StraBe 8
8045 Ismaning, West Germany
Tel: (089) 96050, TLX: 522472
Rapifax: (089) 9605166

Fluke (Deutschland) GmbH
Meineckestrasse 53
4000 Dusseldorf 30, West Germany
Tel: (0211) 450831, TLX: (841) 8585576

Greece ■
Hellenic Scientific Representations Ltd.
11, Vrasside Street
Athens 612, Greece
Tel: (1) 711140, TLX: (863) 219330

Hong Kong ●
Schmidt & Co. (H.K.) Ltd
28th Fl. Wing on Centre
111 Connaught Road
Central Hong Kong
Tel: 5-455644
TLX: 74766

Hungary ■
Amtest Associates Ltd
Clarence House, 31, Clarence St.
Staines, Middlesex TW18 4SY
United Kingdom
Tel: (784) 63555, TLX: 928855

Iceland ●
Kristjan O. Skagfjord Ltd
P.O. Box 906
Reykjavik, Iceland
Tel. 24120, TLX: 2133

India ●
Hinditron Services Pvt. Ltd.
69/A.L. Jagmohandas Marg
Bombay 400 006, India
Tel: 811316, TLX: 112326

Hinditron Services Pvt. Ltd
8th Main Road
33/44-A Raj Mahl Vilas Extension
Bangalore 560 080, India
Tel: 33139, TLX: (953) 0845741

Hinditron Services Pvt. Ltd.
Shantiniketan, Office No.6
6th Floor, 8 Camac Street
Calcutta 700 017, India
Tel: 434032, 447541

Hinditron Services Pvt. Ltd.
204-206 Henkunt Tower
98 Nehri Place
New Delhi, 110019, India
Tel: 640380, TLX. (95) 314890

Hinditron Services Pvt. Ltd
Srinath Complex, 5th Floor
1-1-58/1 to 1-1-58/11
Sarojini Devi Road
Secunderabad 500 003, India
Tel: 821117, TLX. (953) 0155 575

Indonesia ●
P.T. Dwi Tunggal Jaya Sakti
Kebayoran Baru
Jakarta Selatan, Indonesia
Tel: 716374, TLX: 45305

Iraq ■
Fluke (Holland) B.V.
P.O. Box 5053, 5004 EB Tilburg
Zevenheuvelenweg 53, 5048 AN Tilburg
The Netherlands
Tel: (013) 673973, TLX: 52237

Ireland ■
Euro Electronics
32 Brews Hill
Naven County Meath, Ireland
Tel: (46) 23577, TLX: (851) 3182

Israel ■
R.D.T. Electronics Engineering Ltd.
P.O. Box 75
46, Sokolov Street
Ramat Hasharon 47235, Israel
Tel: (3) 483216, TLX: (922) 32143

Italy ■
Sistrel S.p.A.
Via Pelizza da Volpedo 59
20092 Cinisello Balsamo
Milan, Italy
Tel: (2) 6181893, TLX: (843) 334643

Sistrel S.p.A.
Via Giuseppe Armellini No. 39
00143 Rome, Italy
Tel: (6) 5915551, TLX: (843) 68356

Sistrel S.p.A.
Via Cinto
Parco S. Paolo
80126 Naples, Italy
Tel: (81) 7679700

Japan ●
John Fluke Mfg. Co., Inc.
Japan Branch
Sumitomo Higashi
Shinbashi Bldg
1-1-11 Hamamatsucho
Minato-ku, Tokyo, Japan
Tel: (03) 434-0181, TLX: 2424331

FLUKE®

John Fluke Mfg. Co., Inc. / PO Box C9090 / Everett, WA 98206 / (206) 356 5400

Litho in U.S.A. 1/83

Kenya ●
ADCOM Ltd.
P.O. Box 30070
Nairobi, Kenya, East Africa
Tel: 331955, TLX: 22639

Korea ●
Electro-Science Korea Co
C P.O Box 8446
Room 403, Boondo Bldg.
56-12 Jangchung-IKa
Jung-ku
Seoul, Korea
Tel 261-7702, TLX: K25381

Kuwait ■
Al-Bahar Int. Group
P.O Box 26672 Safat
Kuwait, Arabian Gulf
Tel. 4501087, TLX. 44822

Lebanon and Jordan ■
Mabek (Electronic Division)
P.O Box 11-3823
Beirut, Lebanon
Tel: 812523, TLX: (923) 22889

Libya ■
Fluke (Holland) B.V
P.O Box 5053, 5004 EB Tilburg
Zevenheuvelenweg 53, 5048 AN Tilburg
The Netherlands
Tel (013) 673973, TLX 52237

Malaysia ●
Mecomb Malasia SDN BHD
Lot 2, Lorong 13/6A
Petaling Jaya, Malasia
Tel. 573455, TLX MA37605

Mexico ●
Electronica y Tecnologia
Avanzada S.A de C.V.
Pafnucio Padilla 53
Circuito Comercial Satelite
Naucalpann Edo De Mexico
Tel 393 0902
TLX. (383) 017 2697

Nepal ●
Associated Enterprises
GPO Box 790, Pyaphal Tole
Kathmandu, Nepal
Tel 13868

Netherlands ■
Fluke (Nederland) B V
Gasthuisring 14
5041 DS Tilburg
The Netherlands

P O Box 115
5000 AC Tilburg
The Netherlands
Tel: (013) 352455, TLX: 52683

New Zealand ●
McLean Information Technology, Ltd
P.O Box 9464, Newmarket
Auckland 1, New Zealand
Tel. 501-801, TLX. (791) NZ 215 70

McLean Information Technology, Ltd.
P O Box 496
Wellington, New Zealand
Tel: 851-450 or 844-424

Nigeria ●
Mofat Engineering Co., Ltd
P.O. Box 6369
Lagos, Nigeria
Tel 960744, TLX 21353

Norway ■
Morgenstierne & Co A/S
Konghellegate 3
P.O Box 6688, Rodelokka
Oslo 5, Norway
Tel. (2) 356110, TLX (856) 71719

Oman ■
OHI Communications
P.O Box 889
Muscat
Sultanate of Oman
Tel 702666 or 703862
TLX 3168

Pakistan ●
Pak International Operations
505 Muhammadi House
I.I. Chundrigar Road
P O. Box 5323, Karachi, Pakistan
Tel 221127, TLX. (952) 24494

PDR Yemen ■
Fluke (Holland) B V
P.O. Box 5053, 5004 EB Tilburg
Zevenheuvelenweg 53, 5048 AN Tilburg
The Netherlands
Tel (013) 673973, TLX 52237

Peru ●
Importaciones Y Representaciones
Electronicas S A
Avda Franklin D Roosevelt 105
Lima 1, Peru
Tel 288650, TLX. (394) 25663

Philippines ●
Spark Radio & Electronics. Corp
1044 Ongpin St , Sta Cruz
Manila, Philippines
Tel 47-11-94, TLX 27901

Spark Radio & Electronics Corp
Greenhills P.O Box 610
San Juan, Metro-Manila
Philippines Zip 3113
Tel 77-51-92

Poland ■
Amtest Associates Ltd
Clarence House, 31, Clarence St
Staines, Middlesex TW18 4SY
United Kingdom
Tel: (784) 63555, TLX. 928855

Portugal ■
Decada-Equipamentos de
Electronica, Lda
Rue Pedro Nunes, 47-C,
1000 Lisboa, Portugal
P O Box 1128, 1003 Lisboa Codex
Tel. (19) 574984, TLX (832) 18469

Qatar ■
Technology Organisation
P O Box 5549, Doha, Qatar
Tel 321431, TLX (957) 4581

Romania ■
Amtest Associates Ltd
Clarence House, 31, Clarence St
Staines, Middlesex TW18 4SY
United Kingdom
Tel: (784) 63555, TLX 928855

Saudi Arabia ■
Electronic Equipment Marketing Co.
P O Box 3750
Riyadh, Saudi Arabia
Tel: (1) 477-165001
TLX. (928) 201120

Singapore ●
Rank O'Connor's (PTE) Limited
98 Pasir Panjang Road
Singapore 0511
Republic of Singapore
Tel 637944
TLX. RS21023

Somalia ■
Fluke (Holland) B.V
P O Box 5053, 5004 EB Tilburg
Zevenheuvelenweg 53, 5048 AN Tilburg
The Netherlands
Tel. (013) 673973, TLX 52237

South Africa ●
Fluke S A (Pty) Ltd
P O Box 39797, Bramley 2018
Republic of South Africa
Tel: (011) 786-3170, TLX 424328

Spain ■
Hispano Electronics S A
Poligono Industrial Urtinsa
Apartado de Correos 48
Alcorcon (Madrid), Spain
Tel: (1) 6194108
TLX (831) 22404

Sri Lanka ●
Jay-Es Electronics
160 Poorvarama Mawatha
Colombo 5, Sri Lanka
Tel: 073-2393

Sweden ■
Teleinstrument AB
P O Box 4490
162 04 Vallingby, Sweden
Tel. (8) 380370, TLX (854) 15770

Switzerland ■
Traco Electronic AG
Jenatschstrasse 1
8002 Zurich, Switzerland
Tel: (1) 2010711, TLX: (845) 54318

Syria ■
Mabek (Electronic Division)
P.O Box 4238
Damascus, Syria

Taiwan ●
Schmidt Scientific Far East Ltd
906, Chia Hsin Bldg
96, Chung Shan N. Rd., Sec. 2
Taipei, Taiwan
Tel 5414600, TLX. 11111

Thailand ●
Measuretronix Ltd
1899/10 Ramkamhaeng Rd
Huamark, Bangkok 24, Thailand
Tel 3143369, TLX 81143

Tunesia ■
Selep S A R L
6, Rue de Sparte
Tunis - 1000 RP, Tunesia
Tel: (1) 248093, TLX (934) 13030

Turkey ■
Erkman Elektronik Aletler
Ticaret Anonim Sirketi
Necatibey Cad 92/3
Karakoy, Istanbul, Turkey
Tel 441546
TLX (821) 23353

United Arab Emirates ■
Al Sanani Trad Est
P O Box 7187
Abu-Dhabi, United Arab Emirates
Tel 821370 or 821371
TLX 23966

United Kingdom ■
Fluke (Great Britain) Ltd
Colonial Way
Watford, Herts, WD2 4TT
United Kingdom
Tel: (0923) 40511, TLX 934583
Rapifax. (0923) 25067

Uruguay ●
Coasin Uruguaya S A
Casilla de Correos 1400
Libertad 2529
Montevideo, Uruguay
Tel: 78-90-15, TLX: UY6571

U.S.S.R. ■
Amtest Associates Ltd
Clarence House, 31, Clarence St
Staines, Middlesex TW18 4SY
United Kingdom
Tel. (784) 63555, TLX. 928855

Venezuela ●
Coasin, C A
Calle 9 Con Calle 4, Edif Edinurbi
Apartado De Correos
NR-70 136 Los Ruices
Caracas 1070A, Venezuela
Tel: 239-0967, TLX (395) 21027

Yemen ■
Fluke (Holland) B V
P O Box 5053, 5004 EB Tilburg
Zevenheuvelenweg 53, 5048 AN Tilburg
The Netherlands
Tel. (013) 673973, TLX 52237

Yugoslavia ■
Amtest Associates Ltd
Clarence House 31, Clarence St
Staines, Middlesex TW18 4SY
United Kingdom
Tel (784) 63555, TLX 928855

■ Supplied and Supported by —

Fluke (Holland) B V
P.O. Box 5053, 5004 EB Tilburg
Zevenheuvelenweg 53, 5048 AN Tilburg
The Netherlands
Tel: (013) 673973, TLX. 52237

● Supplied and Supported by —

Fluke International Corporation
P.O Box C9090
Everett, WA 98206 U.S.A
Tel (206) 356-5500
TLX. 152662 JOHN FLUKE EVT

FLUKE®

U.S. SALES AREAS for all Fluke products

AK, Anchorage
Harry Lang & Associates
1371 Hillcrest Drive #303
Anchorage, AK 99503
(907) 279-5741

AL, Huntsville
John Fluke Mfg. Co., Inc.
3322 S. Memorial Parkway
Suite 96
Huntsville, AL 35801
(205) 881-6220

AZ, Tempe
John Fluke Mfg. Co., Inc.
2125 S. 48th Street
Suite 104
Tempe, AZ 85282
(602) 967-8724

Tucson
(602) 790-9881

CA, Los Angeles
John Fluke Mfg. Co., Inc.
20902 South Bonita St.
Carson, CA 90746
(213) 538-3900
or (714) 761-2449

San Diego
John Fluke Mfg. Co., Inc.
9601 Aero Drive, Suite 290
San Diego, CA 92123
(714) 226-1254

Santa Clara
John Fluke Mfg. Co., Inc.
2300 Walsh Ave., Bldg. K
Santa Clara, CA 95051
(408) 727-0513

Tustin
John Fluke Mfg. Co., Inc.
15445 Red Hill Ave., Suite F
Tustin, CA 92680
(714) 838-8863

CO, Denver
John Fluke Mfg. Co., Inc.
1980 South Quebec St. #4
Denver, CO 80231
(303) 750-1222

CT, Hartford
John Fluke Mfg. Co., Inc.
Glen Locken East
41-C New London Turnpike
Glastonbury, CT 06033
(203) 659-3541

FL, Orlando
John Fluke Mfg. Co.,Inc.
940 N. Fern Creek Ave.
Orlando, FL 32803
(305) 896-4881

GA, Atlanta
John Fluke Mfg. Co., Inc.
2700 Delk Rd., Suite 250
Marietta, GA 30067
(404) 953-4747

HI, Honolulu
EMC Corporation
2979 Ualena St.
Honolulu, HI 96819
(808) 836-1138

IA, Iowa City
(319) 354-2811

IL, Chicago
John Fluke Mfg. Co., Inc.
3740 Industrial Ave.
Rolling Meadows, IL 60008
(312) 398-0850

IN, Indianapolis
John Fluke Mfg. Co., Inc.
877 Purdue
Suite 101
Indianapolis, IN 46268
(317) 875-7870

KS, Kansas City
John Fluke Mfg. Co., Inc.
4550 W. 109th St., Suite 130
Shawnee Mission, KA 66211
(913) 381-9800

LA, New Orleans
(504) 455-0814

MA, Burlington
John Fluke Mfg. Co., Inc.
25 "B" Street
Burlington MA 01803
(617) 273-4674

MD, Baltimore
(301) 792-7060

Rockville
John Fluke Mfg. Co., Inc.
5640 Fishers Lane
Rockville, MD 20852
(301) 770-1570

MI, Detroit
John Fluke Mfg. Co., Inc.
13955 Farmington Rd.
Livonia, MI 48154
(313) 522-9140

MN, Bloomington
John Fluke Mfg. Co., Inc.
1801 E. 79th St., Suite 9
Bloomington, MN 55420
(612) 854-5526

MO, St. Louis
John Fluke Mfg. Co., Inc.
2029 Woodland Parkway
Suite 105
St. Louis, MO 63141
(314) 993-3805

NC, Greensboro
John Fluke Mfg. Co., Inc.
1310 Beaman Place
Greensboro, NC 27408
(919) 273-1918

NJ, Paramus
John Fluke Mfg. Co., Inc.
P.O. Box 930
West 75 Century Road
Paramus, NJ 07652
(201) 262-9550

NM, Albuquerque
John Fluke Mfg. Co., Inc.
1108 Alvarado Drive N.E.
Albuquerque, NM 87110
(505) 881-3550

NY, Rochester
John Fluke Mfg. Co., Inc.
4515 Culver Road
Rochester, NY 14622
(716) 323-1400

OH, Cleveland
John Fluke Mfg. Co., Inc.
7830 Freeway Circle
Middleburg Heights, OH 44130
(216) 234-4540

Columbus
(614) 889-5715

Dayton
John Fluke Mfg. Co., Inc.
4756 Fishburg Rd.
Dayton, OH 45424
(513) 233-2238

OR, Portland
John Fluke Mfg. Co., Inc.
18360 S.W. Springfield Lane
Aloha, OR 97007
(503) 642-1342

PA, Philadelphia
John Fluke Mfg. Co., Inc.
1010 West 8th Ave., Suite H
King of Prussia, PA 19406
(215) 265-4040

Pittsburgh
(412) 261-5171

TX, Austin
John Fluke Mfg. Co., Inc.
Creek Gardens, Suite 103
8705 Shoal Creek Blvd.
Austin, TX 78758
(512) 459-3344

Dallas
John Fluke Mfg. Co., Inc.
14400 Midway Road
Dallas, TX 75234
(214) 233-9990

Houston
John Fluke Mfg. Co., Inc.
4240 Blue Bonnet Dr.
Stafford, TX 77477
(713) 491-5995

San Antonio
John Fluke Mfg. Co., Inc.
10417 Gulfdale
San Antonio, TX 78216
(512) 340-2621

UT, Salt Lake City
John Fluke Mfg. Co., Inc.
5226 So. 300 West, Suite #2
Salt Lake City, UT 84107
(801) 268-9331

WA, Seattle
John Fluke Mfg. Co., Inc.
5020 148th Ave. N.E.
Suite #110
Redmond, WA 98052
(206) 881-6966

Service Center Areas

CA, Burbank (213) 849-4641
CA, Santa Clara (408) 727-8121
CO, Denver (303) 750-1228
FL, Orlando (305) 896-2296
IL, Chicago (312) 398-5800
MA, Burlington (617) 273-4678
MD, Rockville (301) 770-1576
NJ, Paramus (201) 262-9550
TX, Dallas (214) 233-9945
WA, Everett (206) 356-5560

The following low-cost instruments. . .
are stocked locally and sold by the authorized Distributors listed on the other side of this sheet, as well as by the sales offices shown.

Handheld DMM's: 8020B, 8021B, 8022B, 8024B, 8026B, 8060A, 8062A
Portable DMM's: 8000A, 8010A, 8012A, 8030A, 8040A, 8050A
Digital Counters: 1900A, 1910A, 1911A, 1912A
Digital Thermometers: 2160- and 2170 - Series

All other instruments are sold by the sales offices only.

For more information on Fluke products or Sales Offices you may dial (800) 426-0361 toll-free in most of U.S. From Alaska, Hawaii, or Washington, phone (206) 356-5400. From Canada and other countries phone (206) 356-5500.

FLUKE®
John Fluke Mfg. Co., Inc. P.O. Box C9090, Everett, WA 98206
Fluke (Holland) B.V., P.O. Box 5053, 5004 EB, Tilburg, The Netherlands, Phone (013) 673973
Litho in. U.S.A. 8/82

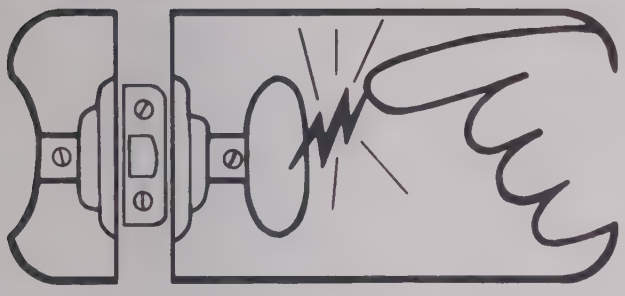
(Blank Page)

(Blank Page)

static awareness

A Message From

John Fluke Mfg. Co., Inc.

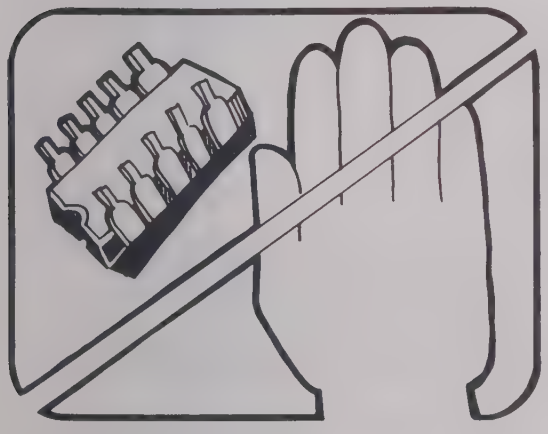


Some semiconductors and custom IC's can be damaged by electrostatic discharge during handling. This notice explains how you can minimize the chances of destroying such devices by:

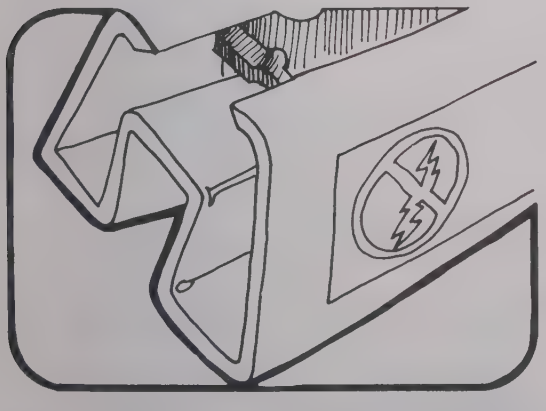
1. Knowing that there is a problem.
2. Learning the guidelines for handling them.
3. Using the procedures, and packaging and bench techniques that are recommended.

The Static Sensitive (S.S.) devices are identified in the Fluke technical manual parts list with the symbol "⊗".

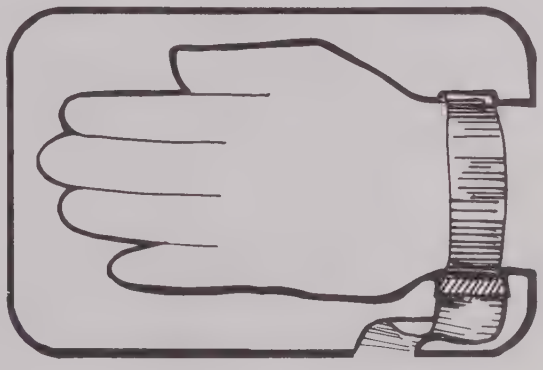
The following practices should be followed to minimize damage to S.S. devices.



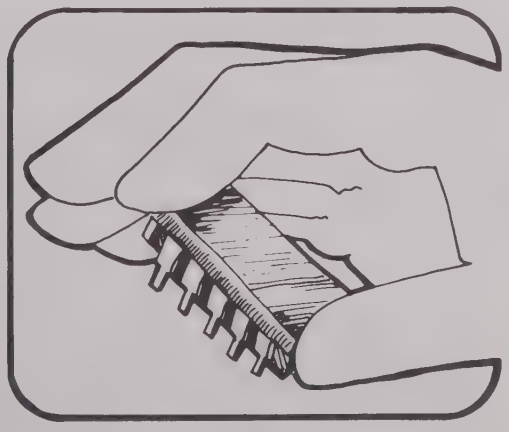
1. MINIMIZE HANDLING



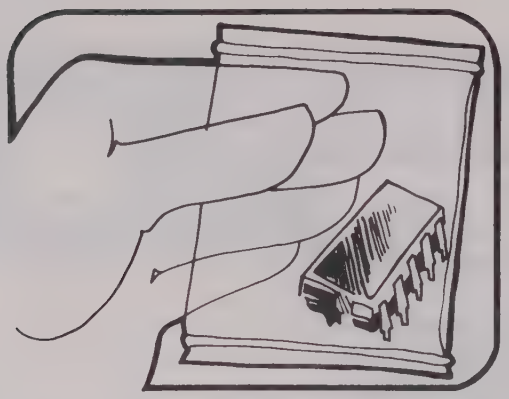
2. KEEP PARTS IN ORIGINAL CONTAINERS UNTIL READY FOR USE.



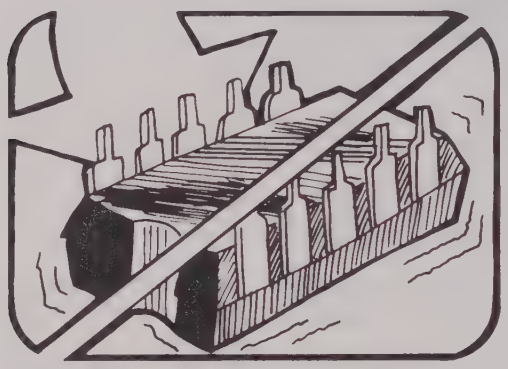
3. DISCHARGE PERSONAL STATIC BEFORE HANDLING DEVICES



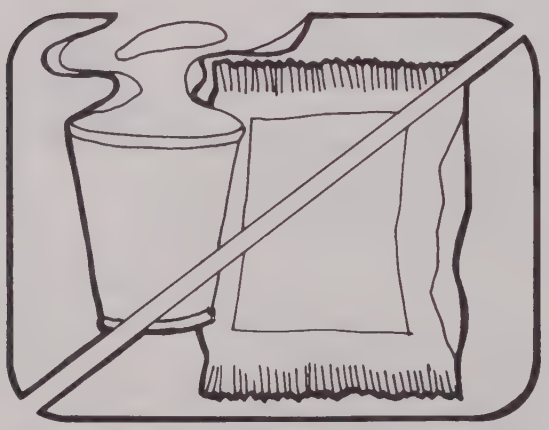
4. HANDLE S.S. DEVICES BY THE BODY



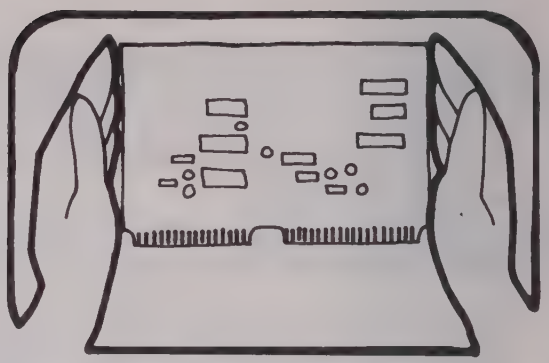
5. USE ANTI-STATIC CONTAINERS FOR HANDLING AND TRANSPORT



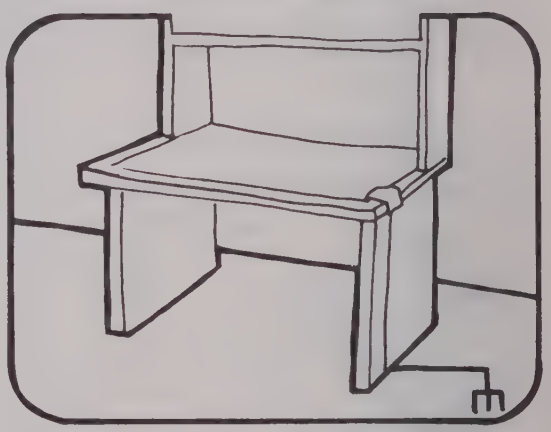
6. DO NOT SLIDE S.S. DEVICES OVER ANY SURFACE



7. AVOID PLASTIC, VINYL AND STYROFOAM® IN WORK AREA



8. WHEN REMOVING PLUG-IN ASSEMBLIES, HANDLE ONLY BY NON-CONDUCTIVE EDGES AND NEVER TOUCH OPEN EDGE CONNECTOR EXCEPT AT STATIC-FREE WORK STATION. PLACING SHORTING STRIPS ON EDGE CONNECTOR USUALLY PROVIDES COMPLETE PROTECTION TO INSTALLED SS DEVICES.



9. HANDLE S.S. DEVICES ONLY AT A STATIC-FREE WORK STATION
10. ONLY ANTI-STATIC TYPE SOLDER-SUCKERS SHOULD BE USED.
11. ONLY GROUNDED TIP SOLDERING IRONS SHOULD BE USED.

Anti-static bags, for storing S.S. devices or pcbs with these devices on them, can be ordered from the John Fluke Mfg. Co., Inc.. See section 5 in any Fluke technical manual for ordering instructions. Use the following part numbers when ordering these special bags.

John Fluke Part No.	Description
453522	6" X 8" Bag
453530	8" X 12" Bag
453548	16" X 24" Bag
454025	12" X 15" Bag
Pink Poly Sheet 30"x60"x60 Mil P/N RC-AS-1200 $20.00	Wrist Strap P/N TL6-60 $7.00

PORTIONS REPRINTED
WITH PERMISSION FROM TEKTRONIX, INC.
AND GENERAL DYNAMICS, POMONA DIV.

® Dow Chemical

J0089B-07U7810/SE EN Litho in U.S.A.

Section 3
Access Procedures

WARNING

WHEN THE INSTRUMENT CASE COVER IS REMOVED, HAZARDOUS VOLTAGES MAY BE PRESENT. TO AVOID ELECTRICAL SHOCK, SPECIAL CARE SHOULD BE TAKEN IN THE AREA WHERE LINE POWER ENTERS THE INSTRUMENT.

3-1. INTRODUCTION

3-2. This section of the manual contains two access procedures: the Maintenance and Routine Calibration Access Procedure and the Non-Routine Calibration Access Procedure. When performing either the Line Voltage Selection or Routine Calibration Adjustments procedures, complete the Maintenance and Routine Calibration Access procedure. When performing the Non-Routine Calibration Adjustments procedure, complete the Non-Routine Calibration Access procedure.

3-3. MAINTENANCE AND ROUTINE CALIBRATION ACCESS

3-4. Complete the following procedure to gain access to the line voltage selection switches and/or the routine calibration adjustments.

1. Remove the six screws from the top case covers as shown in Figure 3-1.

2. Pull the top case cover off the instrument.

3. The line voltage selection switches cover and all routine calibration adjustments are accessible.

4. Loosen the four screws securing the line voltage selection switch cover and lift the cover straight up, if access to the switches is required.

5. For re-assembly, logically reverse this procedure.

3-5. NON-ROUTINE CALIBRATION ACCESS

3-6. Complete the following procedure to gain access to the non-routine calibration adjustments. Use Figure 3-2 for reference:

1. Remove the six screws (A) from the top case cover.

2. Pull the top case cover off the instrument.

3. Remove the four screws (B) from the top and the two screws (C) from the side of the upper guard assembly.

4. Lift the upper guard assembly off the instrument.

5. All non-routine calibration adjustments are now accessible.

6. To reassemble, logically reverse this procedure.

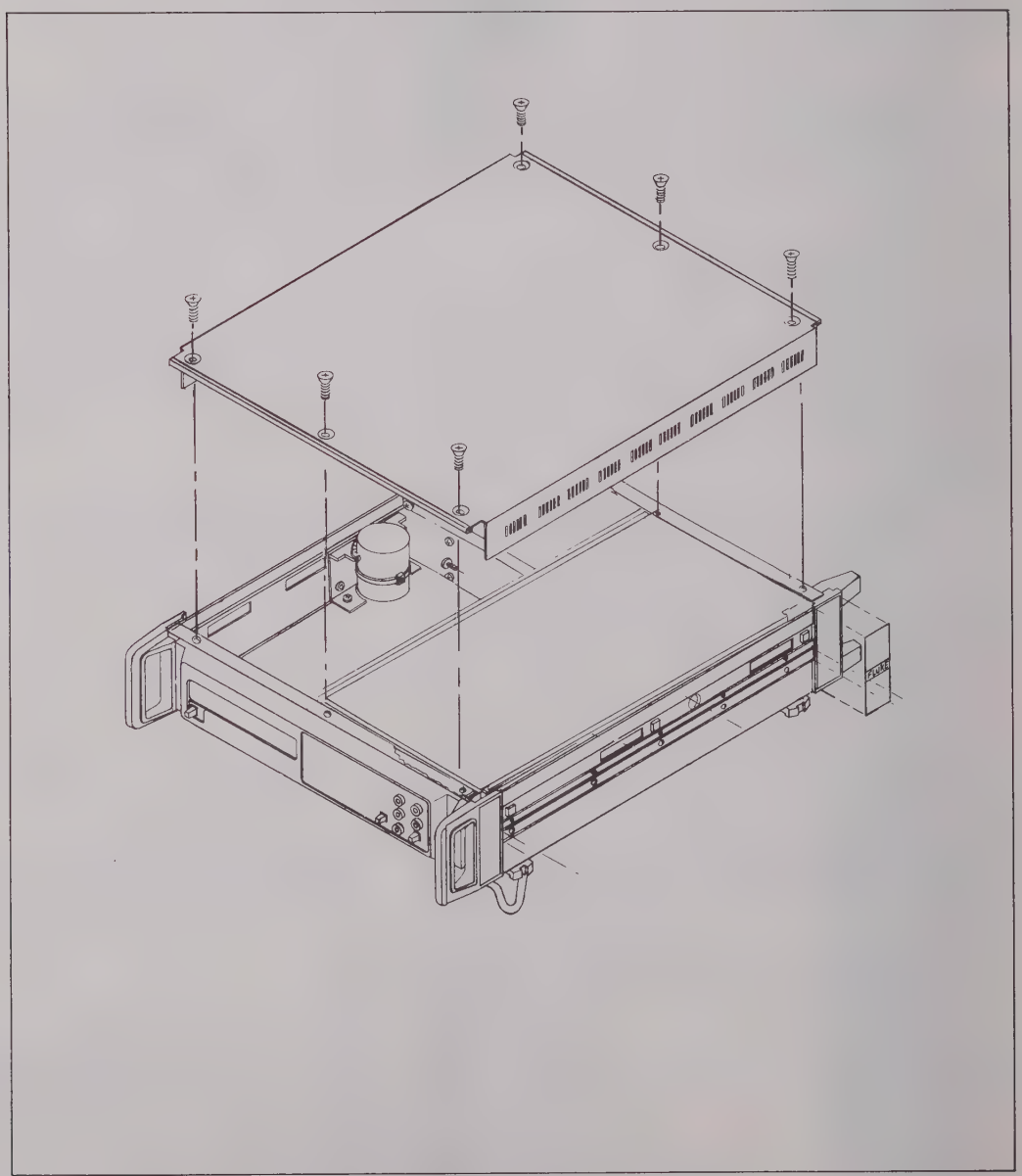


Figure 3-1. Maintenance and Routine Calibration Access

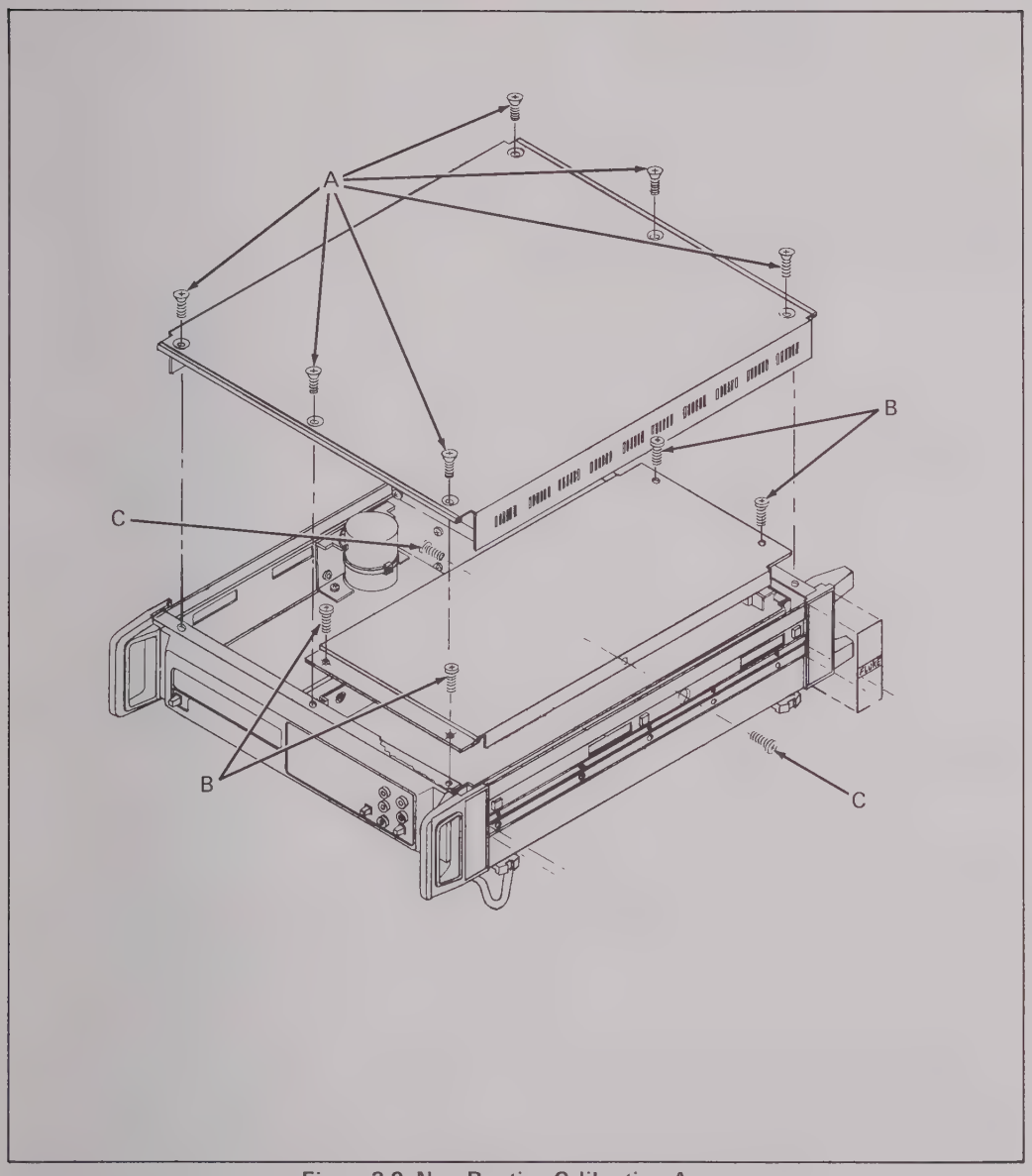


Figure 3-2. Non-Routine Calibration Access

Section 4
General Maintenance

4-1. INTRODUCTION

4-2. This section of the manual contains the general maintenance procedures. These include cleaning instructions, line voltage selection, and fuse replacement. Do no perform any of these procedures when power is applied to the instrument.

4-3. CLEANING INSTRUCTIONS

4-4. Periodically (at least every 90-days) clean the 8520A using the following procedure:

1. Insure power is remove from the 8520A.
2. Remove the top cover and guard, and the bottom cover from the instrument.
3. Clean the interior of the 8520A using low pressure, clean, dry air.
4. Clean the front panel and exterior surfaces with anhydrous ethyl alchohol or a soft cloth, dampened with a mild solution of detergent and water.

4-5. LINE VOLTAGE SELECTION

4-6. Input line voltage for the 8520A may be switch selected from one of four voltages (100, 120, 220, 240) ±10% at frequencies of 50, 60, or 400 ±5% Hertz. Two slide switches are used to select the desired line voltage. The switches are mounted on the power supply transformer located in the left rear of the instrument compartment. Figure 4-1 shows the switches set for the four possible input line voltages. Set the switches using the dot and slot as pictured. When the line voltage settings are changed insure the correct fuse is installed for the setting selected.

4-7. FUSE REPLACEMENT

4-8. Check to insure that the proper fuse is installed for the input line voltage selected. Select the applicable fuse from those listed below:

For 100 or 120V AC, use MDL ½

For 220 or 240V AC, use MDL ¼

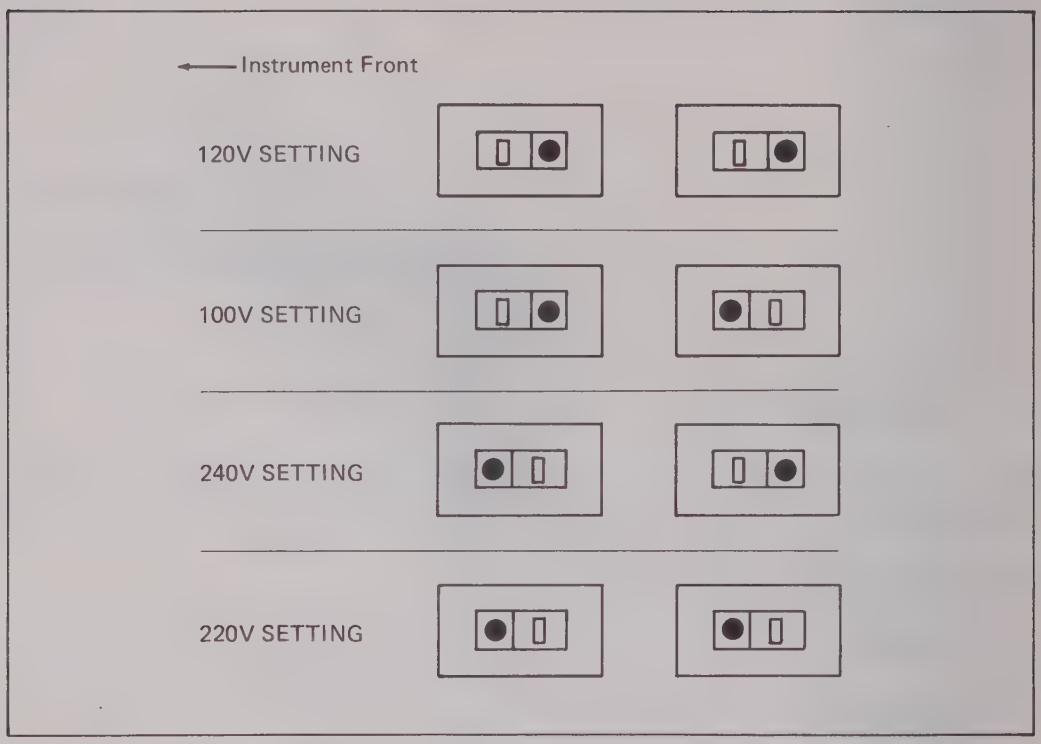


Figure 4-1. Line Voltage Selection Switches

Section 5
Performance Test

5-1. INTRODUCTION

5-2. The following paragraphs contain a performance verification test which compares the instrument's performance to the specifications given in Section 1 of this manual. The test is recommended as an acceptance test when the unit is first received, and later as a calibration procedure to verify instrument accuracy at the scheduled calibration periods, either the normal 90 days or the alternates, 24 hours or 1 year. It is also useful as an aid in troubleshooting.

5-3. Test equipment required for the performance test is listed earlier in Table 1-1. If the recommended equipment is not available, comparable instruments with equivalent specifications may be substituted. To ensure optimum results, the test must be performed at an ambient temperature of 22 to 24 degrees Celsius, with a relative humidity of less than 70%. Also, the instrument should be allowed to warm-up for at least 1 hour before starting the performance test.

5-4. If the instrument does not meet the performance test, troubleshooting, repair, and/or calibration adjustment is indicated. Procedures for calibration adjustment are given later in this manual. Troubleshooting procedures are given in the Service Manual.

5-5. EQUIPMENT PREPARATION

5-6. Perform the following procedure prior to beginning the performance test:

1. Verify the instrument is set for the applicable line voltage using the procedure previously given.
2. Install any guard or outer covers not in place.
3. Connect the instrument to the input line power.
4. Depress the POWER switch to apply line voltage to the instrument.
5. Select Front Panel inputs and NORMAL guard.
6. Allow the instrument to operate for at least 2 hours before beginning the test.

5-7. ZERO VERIFICATION

5-8. Use the following procedure to verify proper meter zeroing:

1. Select the DC Voltage Function and the 100 mV range. The 2 reading per second rate and 500 msec filter are selected automatically with the function.

2. Short the 8520A input terminals.

3. Perform steps 1 through 6 of Table 5-1.

4. Remove the short from the 8520A input terminals.

Table 5-1. Zero Verification

STEP	FUNCTION	RANGE	READING RATE	INPUT	DISPLAY READING
1	V DC	100 mV	2/sec	Short	.000 mV ±6 μV (6 digits)
2	V DC	100 mV	10/sec	Short	.000 mV ±6 μV (6 digits)
3	V DC	1V	2/sec	Short	.00000V ±20 μV (2 digits)
4	V DC	10V	2/sec	Short	.0000V ±100 μV (1 digit)
5	V DC	100V	2/sec	Short	.000V ±2 mV (2 digits)
6	V DC	1000V	2/sec	Short	.00V ±10 mV (1 digit)

5-9. DC VOLTS VERIFICATION

5-10. Use the following procedure to verify proper operation of the V DC measurement function:

1. Connect the equipment as shown in Figure 5-1.

2. Set the DC Voltage Calibrator controls for a 10V output and set the Ratio Standard to .0100000.

3. Select the DC volts function and the 100 mV range. The 2 readings per second rate and 500 msec filter are selected automatically with the function.

4. Select Operate on the DC Voltage Calibrator.

5. Perform step 1 through 10 of Table 5-2, changing the ratio standard and 8520A range settings as required. Record the displayed reading in step 10 of the table.

6. Select a Ratio Standard setting of .088888 and a DC Voltage Standard output (approximately 100 volts) that obtains the recorded display obtained in step 5 above, i.e., step 10 of Table 5-2.

7. Perform step 11 of Table 5-2, setting the Ratio Standard and 8520A range as required.

8. Disconnect the Ratio Standard from the equipment and connect the DC Voltage Standard directly to the 8520A input terminals, output HI to input HI and LO to LO.

9. Perform the steps in Table 5-3, changing the DC Voltage Standard output and 8520A range settings as required.

10. Disconnect the DC Voltage Standard from the 8520A.

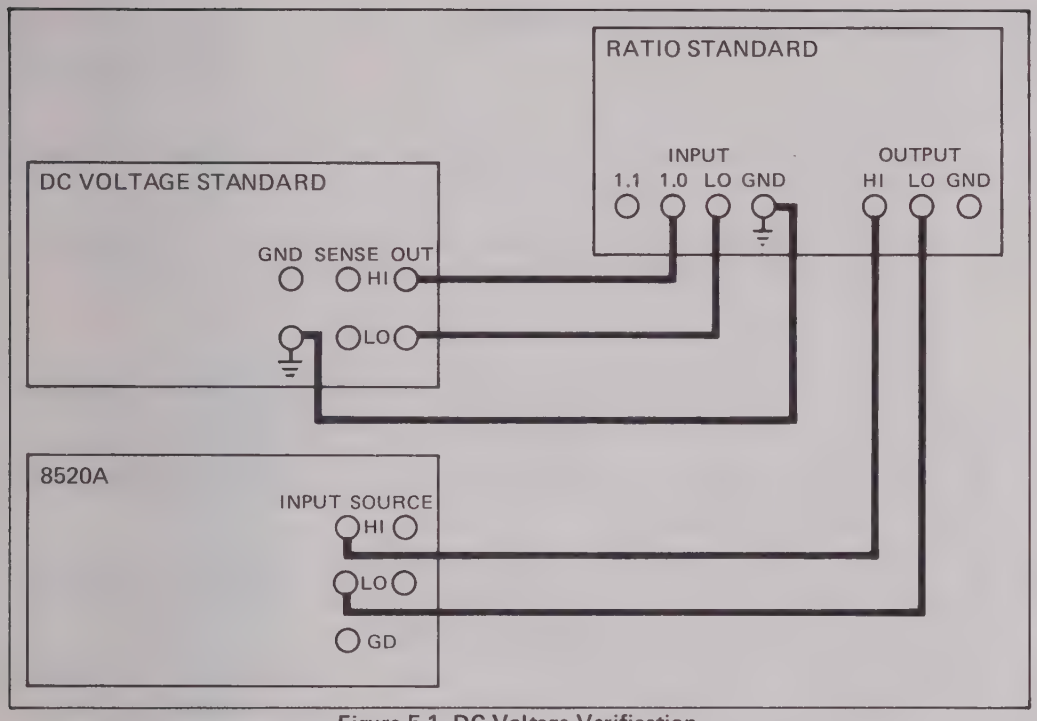


Figure 5-1. DC Voltage Verification

Table 5-2. Low DC Volts Verification

STEP	RANGE	RATIO STANDARD	INPUT	DISPLAY READING
1	100 mV	.0100000	100 mV	100 mV ±12 μV (12 digits)
2	1V	.0111110	.11111V	.11111V ±30 μV (3 digits)
3	1V	.0222220	.22222V	.22222V ±30 μV (3 digits)
4	1V	.0444440	.44444V	.44444V ±50 μV (5 digits)
5	1V	.0888880	.88888V	.88888V ±70 μV (7 digits)
6	1V	.1111110	1.11111V	1.11111V ±90 μV (9 digits)
7	10V	.111110	1.1111V	1.1111V ±.2mV (2 digits)
8	10V	.222220	2.2222V	2.2222V ±.2 mV (2 digits)
9	10V	.444440	4.4444V	4.4444V ±.3 mV (3 digits)
10	10V	.888880	8.8888V	8.8888V ±.5 mV (5 digits)
11	10V	.111111	11.1111V	11.1111V ±.7 mV (7 digits)

Table 5-3. High DC Volts Verification

STEP	DC VOLTAGE STANDARD OUTPUT	8520A RANGE	DISPLAY READING
1	11.111V	100V	11.111V ±3 mV (3 digits)
2	22.222V	100V	22.222V ±4 mV (4 digits)
3	44.444V	100V	44.444V ±5 mV (5 digits)
4	88.888V	100V	88.888V ±8 mV (8 digits)
5	111.111V	100V	111.111V ±10 mV (10 digits)
6	111.11V	1000V	111.11V ±20 mV (2 digits)
7	222.22V	1000V	222.22V ±20 mV (2 digits)
8	444.44V	1000V	444.44V ±40 mV (4 digits)
9	888.88V	1000V	888.88V ±70 mV (7 digits)
10	1000.00V	1000V	1000.00V ±80 mV (8 digits)

5-11. RESISTANCE VERIFICATION

5-12. Use the following procedure to verify proper operation of the resistance measurements functions:

1. Select the Ω 4-wire function and 10Ω range. Select one reading per second, which automatically selects the 1000 msec filter.

2. Short the V/Ω INPUT HI and LO leads, the Ω SOURCE HI and LO leads and then connect the shorted leads with a jumper.

3. The 8520A display reads .0000 ±0.7 mΩ (7 digits).

4. Select the 2 readings per second rate, which automatically selects the 500 msec filter.

5. Perform steps 1 through 7 of Table 5-4, applying the Standard Resistance, and selecting the listed 8520A range.

6. Compute the value of the 10 MΩ standard resistor in nano-siemens by dividing 1 by the corrected standard value, i.e., take the reciprocal of the corrected standard value. The result should be approximately 100 nS.

7. Perform step 8 of Table 5-4.

8. Disconnect the Standard Resistor from the 8520A.

Table 5-4. Resistance Verification

STEP	NOMINAL STANDARD RESISTOR VALUE	8520A RANGE	CORRECTED STANDARD VALUE READING ± TOLERANCE
1	10Ω	10 ohm	10Ω ±1.5 mΩ (15 digits)
2	100Ω	100 ohm	100Ω ±9 mΩ (9 digits)
3	1000Ω	1000 ohm	1000Ω ±90 mΩ (9 digits)
4	10 kΩ	10 kohm	10 kΩ ±.9Ω (9 digits)
5	100 kΩ	100 kohm	100 kΩ ±11Ω (11 digits)
6	1 MΩ	1 Mohm	1 MΩ ±180Ω (18 digits)
7	10 MΩ	10 Mohm	10 MΩ ±5 kΩ (5 digits)
8	10 MΩ	100 nS	100nS ± .10nS (10 digits)

5-13. AC VOLTAGE VERIFICATION

5-14. Use the following procedure to verify proper operation of the V AC function:

1. Select the AC Volts function and the 1 volt range. The 2 readings per second rate and 500 msec filter are selected automatically with the function.

2. Connect the AC Calibrator output to the 8520A input terminals.

3. Perform step 1 through 15 of Table 5-5, setting the AC Calibrator output, and 8520A range as required.

4. Disconnect the AC Calibrator from the 8520A.

5. Connect the AC Calibrator/Power Amplifier combination output to the 8520A input terminals.

6. Perform steps 16 through 19 of Table 5-5, setting the AC Calibrator output, and 8520A range as required.

7. Disconnect all test equipment from the 8520A.

8. This completes the performance test of the 8520A.

Table 5-5. AC Voltage Verification

STEP	AC CALIBRATOR OUTPUT		8520A RANGE	DISPLAY READING BETWEEN:
	VOLTAGE	FREQUENCY		
1	1.100000V	40.00 Hz	1V	1.09830 – 1.10170 (170 digits)
2	1.000000V	20.00 kHz	1V	0.99840 – 1.00160 (160 digits)
3	1.000000V	100.00 kHz	1V	0.98400 – 1.01600 (1600 digits)
4	1.000000V	300.00 kHz	1V	0.96400 – 1.03600 (3600 digits)
5	1.000000V	1.000 MHz	1V	0.87000 – 1.1300 (13,000 digits)
6	2.00000 mV	20.000 kHz	1V	.00140 – .00260 (60 digits)
7	10.00000V	1.0000 kHz	10V	9.9852 – 10.0148 (148 digits)
8	10.00000V	20.000 kHz	10V	9.9852 – 10.0148 (148 digits)
9	10.00000V	100.00 kHz	10V	9.8520 – 10.1480 (1480 digits)
10	10.00000V	300.00 kHz	10V	9.6640 – 10.3360 (3360 digits)
11	10.00000V	1.0000 MHz	10V	8.8000 – 11.2000 (12000 digits)
12	100.0000V	1.0000 kHz	100V	99.861 – 100.139 (139 digits)
13	100.0000V	20.000 kHz	100V	99.861 – 100.139 (139 digits)
14	100.0000V	100.00 kHz	100V	98.610 – 101.390 (1390 digits)
15	50.0000V	200.00 kHz	100V	48.020 – 51.980 (1980 digits)
16	600.0000V	1.0000 kHz	1000V	599.10 – 600.90 (90 digits)
17	600.0000V	20.000 kHz	1000V	599.10 – 600.90 (90 digits)
18	600.0000V	30.000 kHz	1000V	590.93 – 609.07 (907 digits)
19	100.0000V	100.00 kHz	1000V	95.93 – 104.07 (407 digits)

Section 6
Calibration Adjustments

6-1. ROUTINE CALIBRATION ADJUSTMENTS

6-2. Introduction

6-3. The calibration adjustment procedures given in the following paragraphs should be performed after repair of the 8520A and/or when the unit fails the performance-test requirements. If the unit will not respond to, or meet the limits of the adjustment procedures, troubleshooting and repair is indicated. Equipment required for the calibration adjustments is listed earlier in Table 1-1.

6-4. All calibration adjustments are accessible when the top cover is removed from the 8520A. The locations of the assemblies, test points, and adjustments that must be accessed to complete the routine calibration adjustment procedures are placarded on the instrument guard cover.

6-5. To ensure optimum results, the calibration adjustments must be performed at an ambient temperature of 22 to 24 degrees Celsius, with a relative humidity of less than 85%. Also the unit should be allowed to warm-up for at least 1 hour before starting the adjustments procedures.

6-6. Instrument accuracies during the first 24 hours after calibration and for one year after calibration are given in the instrument specification. If accuracies within either of these levels are desired the calibration interval can be adjusted accordingly.

6-7. The 8520A contains three calibration procedures (+5V Power Supplies, Ref Amp, and Auto Zero) that are performed at the factory and do not require further adjustment unless components are replaced within the circuit. These adjustments and the special handling required, are detailed at the end of the calibration procedure in a paragraph titled "Non-Routine Calibration Adjustments".

6-8. Calibration (Cal) Digit

6-9. When selected, the Cal digit appears at the left position of the alphanumeric display to add an additional digit of resolution. This moves the displayed data one position to the right, truncating the right character. The Cal digit is used in the calibration of the dc volt and ohms features. It is switch selectable with an internal push-push switch and is accessable only with the top cover removed.

6-10. Designated S1 on the Digital PCB, the switch causes the Cal digit feature to change states, enabling it if it had been disabled, or disabling it if it had been enabled. The Cal digit feature is automatically disabled if power is removed or a RESET occurs.

Depression of the switch is required to re-enable the feature. The Cal digit feature cannot be selected in remote operation.

6-11. Routine Calibration Preparation

6-12. Prepare the 8520A for routine calibration using the following procedure:

1. Perform the Routine Calibration Access procedure given in Section 3.

NOTE

Do not remove the inner guard cover for a routine calibration.

2. Apply power to the 8520A and allow the instrument to warm-up for 1 hour before beginning the adjustment procedure.

NOTE

The ambient temperature during the warm-up period and the subsequent calibration should be between 22° C and 24° C with the relative humidity less than 70%.

6-13. Reference Supply

6-14. Use the following procedure to perform calibration adjustments on the Reference Supply:

1. Connect the test DMM to TP504 (HI) and TP501 (LO).

2. Depress the RESET keyswitch twice, holding it depressed the second time, short the instrument input terminals. Maintain this condition until the adjustment procedure is complete.

3. Adjust R503 POS REF for a test DMM reading of +6.5000V dc.

4. Connect the test DMM to TP501 (HI) and TP503 (LO).

5. Adjust R504 NEG REF for a test DMM reading of +6.5000V dc.

6. Release the RESET keyswitch and remove the test DMM from the instrument.

6-15. A/D Converter

6-16. Use the following procedure to complete the A/D Converter calibration adjustments:

1. Select the dc volts function, the 10V range, the 2 reading/sec rate, the 1000 msec filter, and the Cal digit feature, in that sequence.

2. Short the instrument input terminals.

3. Adjust R513 for an instrument display of .0000 0 ±2 Cal digits.

4. Connect the equipment as shown in Figure 6-1, i.e., with the DC Calibrator output connected to the Ratio Standard input LO, and the DC Calibrator output LO to the Ratio Standard 1.0 input.

5. Set the Ratio Standard to .8100000.

6. Select a +10.00000V DC Calibrator output.

7. Adjust R522 for an instrument display of -8.1000 0 ±2 Cal digits.

8. Set the DC Calibrator to STANDBY then reverse the output leads at the DC Calibrator. Return the DC Calibrator to OPERATE to obtain an instrument input of +8.1000 0V dc.

9. Adjust R504 for an instrument display of +8.1000 0 ±2 Cal digits.

10. Perform steps 6 through 9 until both readings are within the stated tolerance without adjustment.

11. Perform the checks and adjustments in Table 6-1.

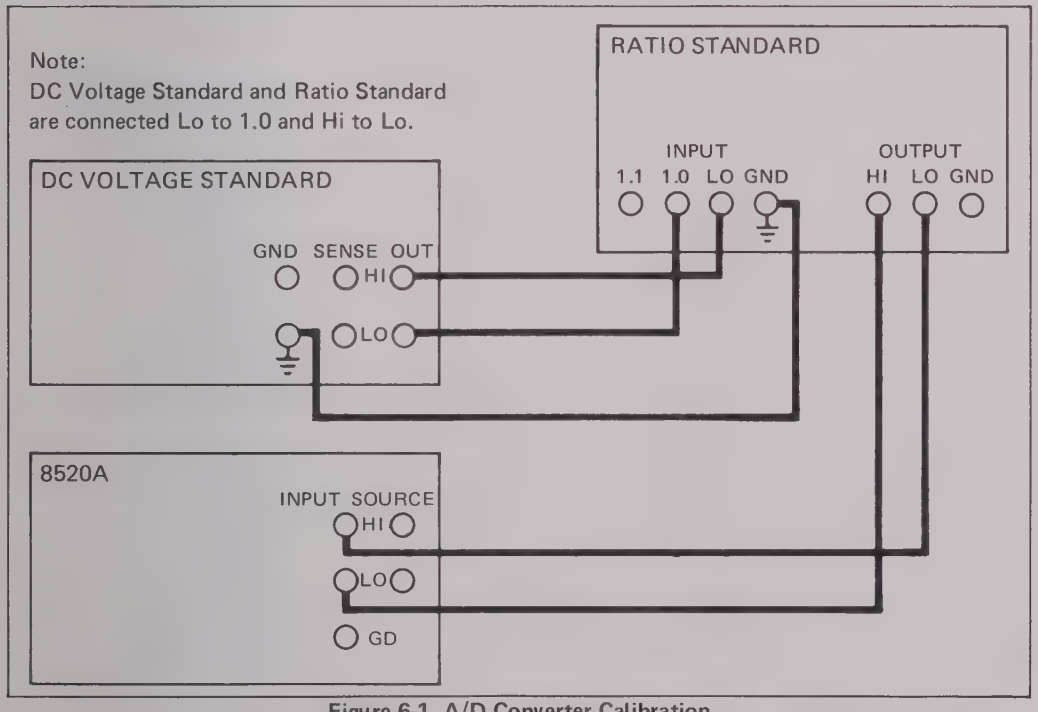


Figure 6-1. A/D Converter Calibration

Table 6-1. A/D Converter Calibration

	VOLTAGE CALIBRATOR SETTING	RATIO STD. SETTING	8520A INPUT	ADJUSTMENT	DISPLAY ± CAL DIGITS
1	+10V	.4100000	4.1V	R521	4.1000 0 ±2
2	+10V	.2100000	2.1V	R520	2.1000 0 ±2
3	+10V	.1100000	1.1V	R519	1.1000 0 ±2
4	+10V	.0600000	0.6V	R518	.6000 0 ±2
5	+10V	.0300000	0.3V	R527	.3000 0 ±2

12. Select a ratio standard setting of 0.0800000 and a DC Voltage Calibrator output of 100V dc.

13. Adjust the DC Voltage Calibrator for an 8520A display of 8.0000 0 ±2 Cal digits.

14. Verify the display readings in Table 6-2. These are no adjustments for these readings.

15. Set the DC Calibrator to STANDBY then reverse the DC Calibrator output leads. Return the DC Calibrator to OPERATE to obtain a negative input to the 8520A.

16. Repeat the steps in Table 6-2 and verify that the readings are as shown, but of a negative polarity.

17. Depress the CAL switch to disable to the CAL Digit feature.

18. Disconnect the test equipment from the instrument.

Table 6-2. A/D Converter Tests

STEP	RATIO STANDARD SETTING	8520A INPUT	DISPLAY ± CAL DIGITS
1	.0100000	1.0V	1.0000 0 ±2
2	.0200000	2.0V	2.0000 0 ±2
3	.0300000	3.0V	3.0000 0 ±4
4	.0400000	4.0V	4.0000 0 ±2
5	.0500000	5.0V	5.0000 0 ±4
6	.0600000	6.0V	6.0000 0 ±6
7	.0700000	7.0V	7.0000 0 ±6
8	.0800000	8.0V	8.0000 0 ±2
9	.0900000	9.0V	9.0000 0 ±8
10	.1000000	10.0V	10.0000 0 ±10
11	.1100000	11.0V	11.0000 0 ±12
12	.1200000	12.0V	12.0000 0 ±15
13	.1300000	13.0V	13.0000 0 ±15
14	.1400000	14.0V	14.0000 0 ±15
15	.1500000	15.0V	15.0000 0 ±15
16	.1600000	16.0V	16.0000 0 ±15

6-17. DC Buffer

6-18. Use the following procedure to complete the DC Buffer calibration adjustments:

1. Short the 8520A input terminals.

2. Select the volts dc function and the 100 mV range.

3. Select the 2 readings per second rate, which automatically selects the 500 msec filter.

4. Adjust C231 for a reading of .000 mV ±1 μV.

5. Select the 10 readings per second rate, which automatically selects the 100 msec filter.

6. Adjust C225 for equal alternations between the plus and minus signs.

7. Repeat steps 3 through 6 until both readings are within the stated tolerance without adjustment.

8. Remove the short on the input terminals and replace it with the 1 MΩ/1 μF parallel load.

9. Select the 2 readings per second rate then verify that the instrument displays .000 mV ±50 μV.

10. Remove the load from the input terminals.

11. Connect the 8520A to the DC Calibrator and Ratio Standard as shown in Figure 5-1 for a positive input to the 8520A.

12. Select a DC Voltage Calibrator output of 10V and set the Ratio Standard to .0190000.

13. Adjust R253 for an 8520A display reading of 190.000 mV ±2 digits.

14. Select the 1 volts range and the Cal digit feature on the 8520A.

15. Set the Ratio Standard to .190000.

16. Adjust R251 for an 8520A display reading of 1.90000 0 ±6 Cal digits.

17. Set the DC Calibrator to STANDBY and remove the ratio standard from the circuit, connecting the DC Calibrator directly to the 8520A for a positive input, i.e., HI to HI and LO to LO.

18. Select the 100 volts range on the 8520A.

19. Select a DC Voltage Calibrator output of 120.000V dc.

20. Adjust R109 for an 8520A display reading of 120.000 0 ±6 Cal digits.

21. Disconnect the DC Calibrator from the 8520A.

6-19. Ohms Converter

6-20. Complete the Ohms Converter calibration adjustments by performing, in sequence, each step in Table 6-3. Manually select the range indicated and short the input in step 1 at the far end of the input leads. When the adjustments are complete depress the CAL digit switch to disable the CAL digit feature.

Table 6-3. Ohms Converter Calibration

STEP	FUNCTION	RANGE IN OHMS	READING RATE	FILTER	STANDARD RESISTOR INPUT	ADJUSTMENT	DISPLAY ± CAL DIGIT
1	Ω4 WIRE	10	2/sec	500msec	Short	R325	.0000 0 ±20
2	Ω4 WIRE	10k	2/sec	500msec	10k	R311	10.0000 0 ±15
3	Ω4 WIRE	1000	2/sec	500msec	1k	R314	1.00000 0 ±15
4	Ω4 WIRE	100	2/sec	500msec	100	R317	100.000 0 ±15
5	Ω2 WIRE	100k	2/sec	Fast	100k	R315	100.000 0 ±20
6	Ω2 WIRE	1M	1/sec	Slow	1M	R319	1.00000 0 ±20

6-21. AC Converter

6-22. Use the following procedure to complete the AC Converter calibration procedures:

1. Select the AC plus DC function and the 1 volt range. The 2 readings per second rate and 500 msec filter are selected automatically with the function.

2. Short the 8520A input terminals.

3. Connect a test DMM set for the 100 mV dc range to J418 (HI) and TP402 (LO).

NOTE

TP402 is not placarded on the guard cover, however, it is accessible through the J418 or R440 slots.

4. Adjust R408 for a test DMM reading of 0.000 mV ±15 μV (15 digits). Record the reading.

5. Remove the short from the input terminals and the test DMM from the circuit.

NOTE

J418 is a removable jumper. Exercise caution removing the DMM probe from the jumper.

6. Connect a DC Voltage Standard to the 8520A input terminals for a negative input. The 8520A remains in the AC plus DC function and 1 volt range previously selected.

7. Perform steps 1 and 2 of Table 6-4. Repeat until both steps are within the stated tolerance without further adjustment.

8. Perform step 3 and 4 of Table 6-4. Repeat step 1 through 4 of the table until all are within the listed tolerance without further adjustment.

9. Select the AC voltage function and the 1 volt range. The 2 readings per second rate and 500 msec filter are selected automatically with the function.

10. Repeat steps 1 through 5 of the procedure, adjusting R408 for the reading recorded in step 4.

11. Connect an AC Voltage Calibrator output to the 8520A input terminals.

12. Perform steps 1 through 8 of Table 6-5.

13. Remove the test equipment from the instruments.

14. The calibration procedure is complete.

Table 6-4. AC Converter AC + DC Calibration

STEP	INPUT	ADJUSTMENT	READING
1	−.0040000	R463	−.00400V ±50 μV (5 digits)
2	+.0040000	R445	+.00400V ±50 μV (5 digits)
3	−1.000000	–	Record Reading
4	+1.000000	R440	Recorded Reading ±200μV (20 digits)

Table 6-5. AC Converter AC Calibration

STEP	RANGE	INPUT	ADJUSTMENT	DISPLAY
1	1V	1.6V ac @ 200 Hz	R481	1.60000V ±80 μV (8 digits)
2	10V	11V ac @ 200 Hz	R422	11.0000V ±600 μV (6 digits)
3	100V	100V ac @ 200 Hz	R433	100.000V ±6 mV (6 digits)
4	1000V	600V ac @ 200 Hz	R438	600.00V ±60 mV (6 digits)
5	1000V	600V ac @ 20 kHz	C403	600.00V ±150 mV (15 digits)
6	1V	1.6V ac @ 20 kHz	C408	1.60000V ±120 μV (12 digits)
7	10V	11V ac @ 20 kHz	R425	11.0000V ±1.2 mV (12 digits)
8	100V	110V ac @ 20 kHz	R426	110.000V ±12 mV (12 digits)

6-23. NON-ROUTINE CALIBRATION ADJUSTMENTS

6-24. Introduction

6-25. The Calibration adjustments listed in the following sub-paragraphs are non-recurring in nature and should be performed only when a component has been changed in the applicable circuit. The others may be verified, if desired, at that time.

6-26. Preparing for Non-Routine Calibration

6-27. Allow a 2 hour warm-up period before beginning any of the procedures, then complete the Non-Routine Calibration Access procedure in Section 3 and perform the adjustments. When the procedure is complete replace the inner guard cover and allow the operating temperature to stabilize with an additional 30 minute warm-up period before doing a Performance Test or Routine Calibraton Adjustment.

6-28. Power Supply

6-29. Use the following procedure to complete the Power Supply calibration adjustments:

1. Connect the test DMM set for approximately 5V dc to TP201 (HI) and TP202 (LO) on the digital assembly.

2. Adjust R204 for a reading between +4.9 and +5.2V dc.

3. Transfer the test DMM leads to TP701 (HI) and TP702 (LO) on the Analog Assembly.

4. Adjust R710 for a reading between +4.9 and +5.2V dc.

5. Remove the test equipment from the instruments.

6-30. Auto Zero

6-31. Use the following procedure to complete the Auto Zero Calibration Adjustments:

1. Short the instrument input terminals.

2. Select volts dc, 100 mV range, and the 2 reading/sec rate (which automatically selects the 500 msec filter).

3. Connect an oscilloscope between TP206 and TP207 (ground).

4. Adjust R236 for an oscilloscope display with the squarewave amplitude less than 10 mV peak-to-peak as shown in Figure 6-2. (Suggested initial oscilloscope settings are 20 ms/cm and 100 mV/div, then adjust for at least two repitions of the waveform).

NOTE

The 10 mV waveform measurement is made on the body of the squarewave; ignore the spikes.

5. Remove test equipment from the instrument.

6-32. Reference Amplifier

6-33. Some units have a small PCB assembly installed in the A/D Converter section in place of U501. Two different configurations of the assembly are used, one parallel and the other perpendicular to the Analog Assembly; however, both are electrically identical. When the Ref Amp assembly is installed use the following procedure to re-adjust the circuit if any component in it is changed. If either U2, R15, or R16 fail, they must be replaced as a matched set.

1. Connect a test DMM to the cathode CR1 (HI) on the Ref Amp Assembly and TP501 (LO) on the A/D Converter section of the Analog Assembly.

NOTE

The point monitored is the electrical junction of R1, R2, R3, R15, and the cathode of CR1.

2. Adjust R3 on the Ref Amp Assembly for a DMM reading of 11V dc ±20 mV dc.

3. Remove the test equipment from the instrument.

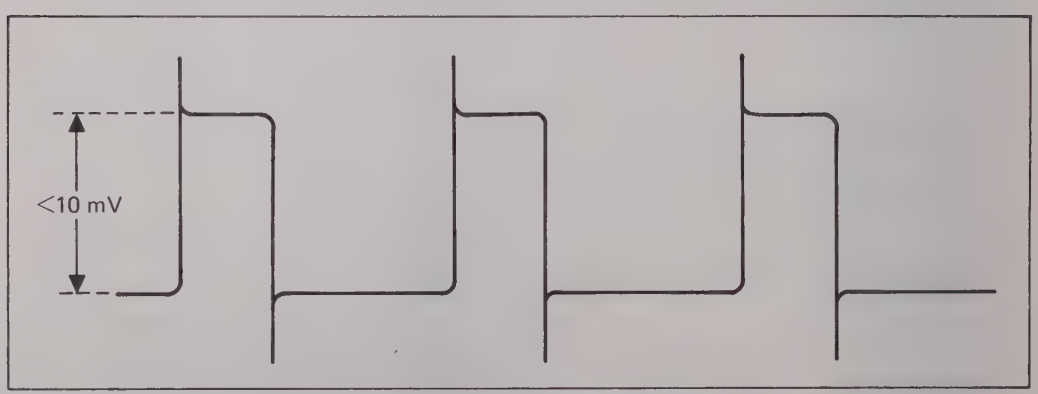
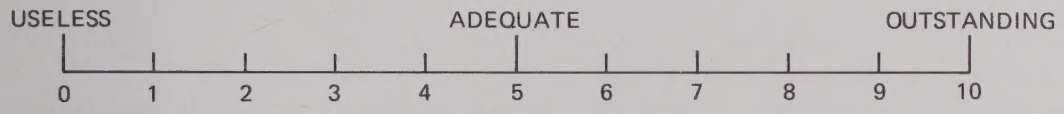


Figure 6-2. Auto Zero Calibration Waveform

John Fluke Mfg. Co., Inc.
WELCOMES YOUR EVALUATION OF THIS MANUAL

We know that the quality of this instruction manual is important to you. Help us improve that quality by giving us your inputs.

Using a scale of 0 to 10, evaluate each section of the manual or, if you prefer, only the sections that are of specific interest to you.



Fill In Scale Rating For Each Section

EVALUATION AREA	SECTIONS											
	1	2	3	4	5	6						
Accuracy												
Sufficient Information												
Conviently Organized												
Clearly Written												
Easily Understood												
Clearly Illustrated												
Quality of Printing and Production												

SUGGESTED IMPROVEMENTS/COMMENTS

Please print or type

Manual _____ Title _____

FROM: Name _____ Company _____

Address _____ City _____ State _____ Zip _____

Detach, Fold, Staple and Mail - No Postage Required if Mailed in United States

8520A

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 604 EVERETT, WA

POSTAGE WILL BE PAID BY ADDRESSEE

John Fluke Mfg. Co., Inc.
Attention: Technical Publications
P.O. Box C9090
Everett, WA 98206

www.manualsplus.com
1028578
SE Laboratories
LOC: U4
MAN – 03532